

**Non-Confidential Business Information
(Non-CBI)**

Certification Test Report

Hearth and Home Technologies

Freestanding Wood Stove

Model: Intrepid FlexBurn 2115-CAT

Prepared for: Hearth and Home Technologies
352 Mountain House Road
Halifax, PA 17032

Prepared by: OMNI-Test Laboratories, Inc.
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Test Period: January 3, 2018 – January 16, 2018

Report Date: February 2018

Report Number: 0135WS038E

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AUTHORIZED SIGNATORIES

This report has been reviewed and approved by the following authorized signatories:

Technician:



Bruce Davis
OMNI-Test Laboratories, Inc.

QA Review:



Alex Tiegs, QA Administrator
OMNI-Test Laboratories, Inc.

Evaluation Decision:



Sebastian Button, Testing Supervisor
OMNI-Test Laboratories, Inc.

February 2, 2018

Issue Date

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Section 1

Sampling Procedures and Test Results

INTRODUCTION

Hearth and Home Technologies retained *OMNI* to perform U.S. Environmental Protection Agency (EPA) certification testing on the Intrepid FlexBurn 2115-CAT catalytic wood stove. The Intrepid FlexBurn 2115-CAT wood stove is a radiant freestanding-type catalytic room heater. The firebox is constructed of cast iron. Usable firebox volume was measured to be 1.31 cubic feet and the stove is vented through a six-inch flue collar located at the rear of the stove top.

The testing was performed at OMNI-Test Laboratories located in Portland Oregon. The altitude of the laboratory is 30 feet above sea level. The unit was received in good condition and logged in on December 19, 2017, then assigned and labeled with *OMNI* ID #2264. *OMNI* representative Bruce Davis conducted the certification testing and completed all testing by January 16, 2018.

This report is organized in accordance with the EPA-recommended outline and is summarized in the Table of Contents immediately preceding this section. The results in this report are limited to the item submitted.

SAMPLING PROCEDURE

The Intrepid FlexBurn 2115-CAT catalytic wood stove was tested in accordance with the U.S. EPA 40 CFR Part 60, Subpart AAA – Standards of Performance for New Residential Wood Heaters using EPA Method 28R, ASTM E2515 and ASTM E2780. Particulate emissions were measured using sampling trains consisting of two filters (front and back).

The model Intrepid FlexBurn 2115-CAT was tested for thermal efficiency and carbon monoxide (CO) emissions in accordance with CSA B415.1-10.

SUMMARY OF RESULTS

The weighted average emissions of the four test runs included in the results indicate a particulate emission rate of 0.35 grams per hour. A total of five tests were conducted, one test was requested by the EPA to demonstrate the appliance would not achieve a category 3 burn rate. This test was investigative in nature and was not included in the test series data, see EPA correspondence in Appendix A. The Intrepid FlexBurn 2115-CAT results are within the emission limit of 2.0 g/hr. for affected facilities manufactured on or after May 15, 2020.

The proportionality results for all 5 test runs were acceptable. Quality check results for each test run are presented in Section 4 of this report.

INDIVIDUAL RUN SUMMARIES – Certification Testing

- Run 1 -** Attempted category 2 burn rate at primary air control arm setting of 2.96” from the stove top right corner. Observed burn rate of 1.00 kg/hr. (category 2). No sampling anomalies occurred, so this test run is valid for inclusion in the weighted average.
- Run 2 -** Attempted category 1 burn rate at primary air setting of full closed. Observed burn rate of 0.73 kg/hr. (category 1). No sampling anomalies occurred, so this test run is valid for inclusion in the weighted average.
- Run 3 -** Attempted category 4 burn rate at primary air setting of fully open. Observed burn rate of 1.09 kg/hr. (category 2). Quality checks found probe weights exceeded allowable negative weights. ASTM 2515 allows a maximum negative weight of 5% of sample catch, with a sample catch of 1.3 mg. this gives an allowable negative weight of 0.065 mg. Allowable tare weight variation with the method is 0.2 mg., since the negative weight was within the allowable variation defined by the method it was deemed to be within specification. No additional sampling anomalies occurred, so this test run is valid for inclusion in the weighted average.
- Run 4 -** Attempted category 4 burn rate at primary air setting of full open; Observed burn rate of 1.15 kg/hr. (category 2). Quality checks found probe weights exceeded allowable negative weights. ASTM 2515 allows a maximum negative weight of 5% of sample catch, with a sample catch of 1.3 mg. this gives an allowable negative weight of 0.065 mg. Allowable tare weight variation with the method is 0.2 mg., since the negative weight was within the allowable variation defined by the method it was deemed to be within specification. No additional sampling anomalies occurred, so this test run is valid for inclusion in the weighted average.

Table 1 – Particulate Emissions

Run	Burn Rate (kg/hr dry)	ASTM E2515 Emissions (g/hr)
1	1.00	0.51
2	0.73	0.20
3	1.09	0.31
4	1.15	0.37
Weighted particulate emission average of 4 test runs: 0.35 grams per hour.		

Table 2 – Particulate Emissions (First Hour)

Run	ASTM E2515 Emissions – First Hour (g/hr)
1	0.46
2	0.47
3	0.84
4	0.19

Table 3 – B415.1 Efficiency and CO Emissions

Run	Heat Output (BTU/hr)	HHV Efficiency (%)	LHV Efficiency (%)	CO Emissions (g/MJ Output)	CO Emissions (g/kg Dry Fuel)	CO Emissions (g/min)
1	14,544	78.4	84.7	1.95	30.36	0.4995
2	10,665	78.4	84.7	2.50	38.79	0.468
3	15,235	75.0	81.0	4.11	61.03	1.0998
4	15,906	74.9	80.9	4.35	64.45	1.2147
Weighted average HHV efficiency of 5 test runs: 76.7%.						

Table 4 – Test Facility Conditions

Run	Room Temperature (°F)		Barometric Pressure (Hg)		Air Velocity (ft/min)	
	Before	After	Before	After	Before	After
1	72	73	30.19	30.14	<50	<50
2	72	70	30.10	30.08	<50	<50
3	73	69	30.12	30.11	<50	<50
4	68	71	29.89	29.78	<50	<50

Table 5 – Fuel Measurement and Crib Description Summary – PRETEST

Run	Pretest Fuel Weight (Starting weight in lbs)	Pretest Moisture (Dry basis - %)	Coal Bed Weight (lbs)
1	9.9	21.7	2.0
2	10.0	22.63	2.0
3	10.0	20.83	2.0
4	10.0	21.64	2.1

Table 6 – Fuel Measurement and Crib Description Summary – TEST

Run	Test Fuel Wet Basis (lbs)	Firebox Volume (ft ³)	Fuel Loading Density Wet Basis (lbs/ft ³)	Test Fuel Dry Basis (lbs)	Piece Length (in)	2x4s Used	4x4s Used
1	8.5	1.31	6.49	7.2	13.5	5	0
2	8.5	1.31	6.49	7.1	13.5	5	0
3	8.5	1.31	6.49	7.1	13.5	5	0
4	8.7	1.31	6.64	7.3	13.5	5	0

Table 7 – Dilution Tunnel Gas Measurements and Sampling Data Summary

Run	Length of Test (min)	Average Dilution Tunnel Gas Measurements		
		Velocity (ft/sec)	Flow Rate (dscf/min)	Temperature (°F)
1	195	13.15	146.4	92
2	266	13.21	148.4	85
3	177	13.23	146.7	93
4	173	14.04	154.1	93

Table 8 - Average Temperature Data

Run	Beginning Surface Temperature Average ^a	Ending Surface Temperature Average ^a	Surface Delta T ^b
1	428	375	53
2	421	314	107
3	463	373	90
4	458	385	73

a. All temperatures are in degrees F.
 b. Represents the difference between beginning and ending average surface temperatures.

Table 9 – Pretest Configuration

Run	Combustion Air	Fuel Added	Fuel Removed	Time (min)
1	2.96" from corner of stove top.	13.7	0	97
2	Fully closed	13.4	0	123
3	Fully open	13.5	0	90
4	Fully open	13.8	0	91

Table 10 – Test Configurations

Run	Five-Minute Startup Procedures	Combustion Air
1	<u>Fuel Loading</u> : Fuel loaded by 55 seconds <u>Door</u> : Closed by 60 seconds <u>Bypass</u> : Closed by 1 minute <u>Primary Air</u> : At test setting entire test <u>Secondary</u> : No user adjustment <u>Fan</u> : N/A	Control arm 2.96” from corner of stove top.
2	<u>Fuel Loading</u> : Fuel loaded by 53 seconds <u>Door</u> : Closed by 57 seconds <u>Bypass</u> : Closed by 60 seconds <u>Primary Air</u> : At test setting entire test <u>Secondary</u> : No user adjustment <u>Fan</u> : N/A	Fully closed
3	<u>Fuel Loading</u> : Fuel loaded by 49 seconds <u>Door</u> : Closed by 55 seconds <u>Bypass</u> : Closed by 55 seconds <u>Primary Air</u> : At test setting entire test <u>Secondary</u> : No user adjustment <u>Fan</u> : N/A	Fully open
4	<u>Fuel Loading</u> : Fuel loaded by 50 seconds <u>Door</u> : Closed by 55 seconds <u>Bypass</u> : Closed by 55 seconds <u>Primary Air</u> : At test setting entire test <u>Secondary</u> : No user adjustment <u>Fan</u> : N/A	Fully open

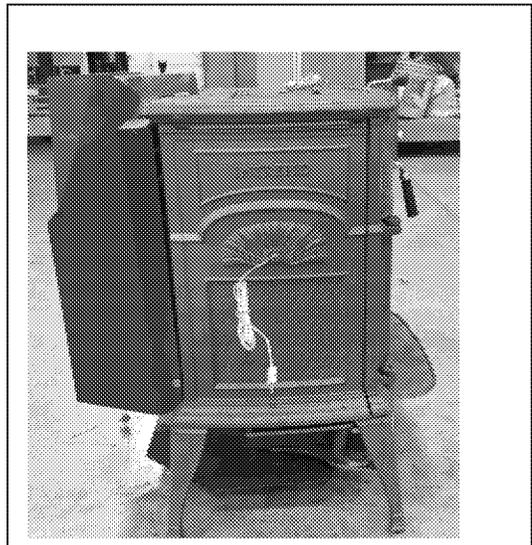
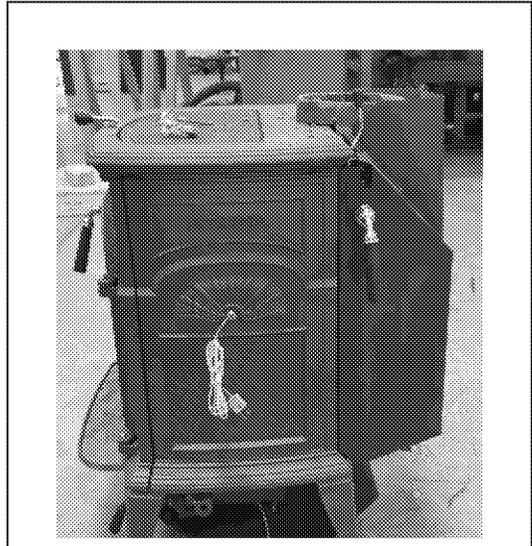
*Model: Intrepid FlexBurn 2115-CAT
Hearth and Home Technologies
352 Mountain House Road
Halifax, PA 17032*

Section 2

Photographs/Appliance Description/Drawings

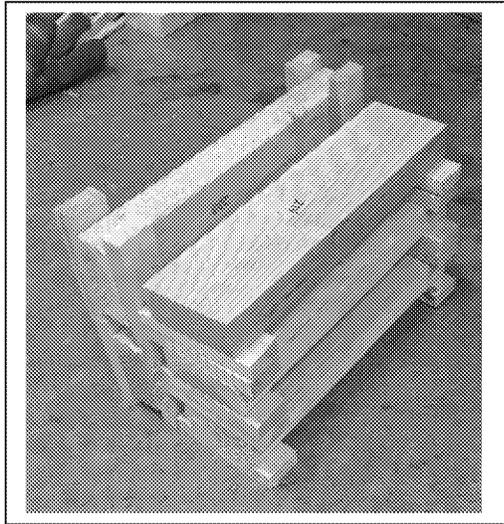
Model: Intrepid FlexBurn 2115-CAT
Hearth and Home Technologies
352 Mountain House Road
Halifax, PA 17032

Hearth and Home Technologies
Intrepid FlexBurn 2115-CAT
Test Dates: January 3, 2018 – January 16, 2018

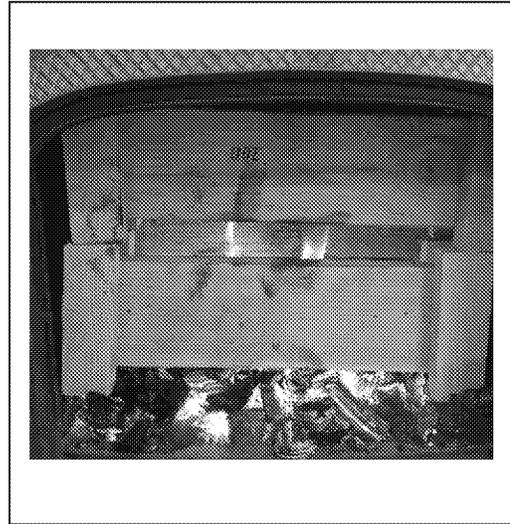


Hearth and Home Technologies Intrepid FlexBurn 2115-CAT

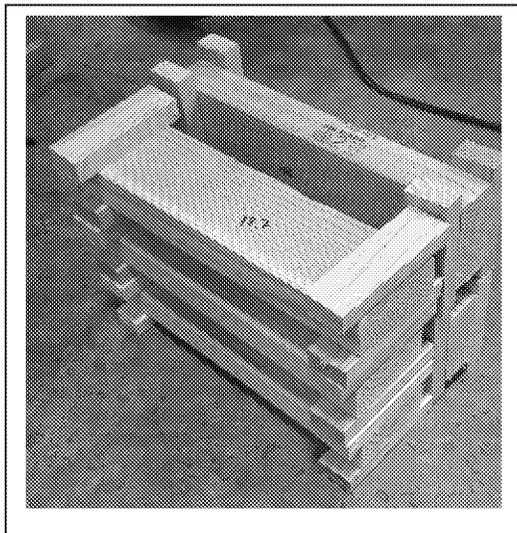
Run 1 – Fuel



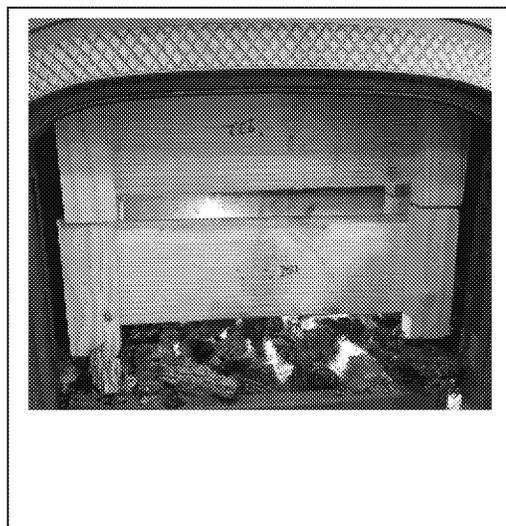
Run 1 – Newly Loaded Stove



Run 2 – Fuel

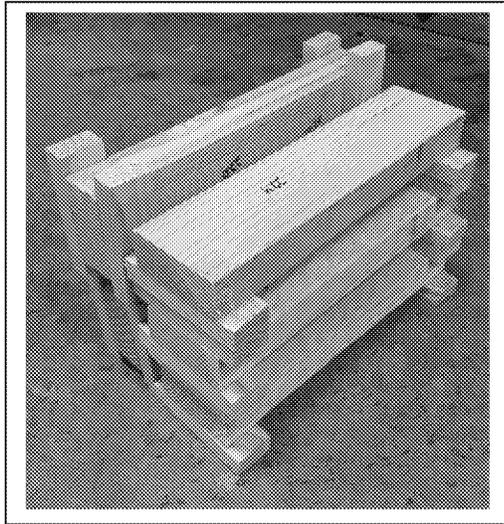


Run 2 – Newly Loaded Stove

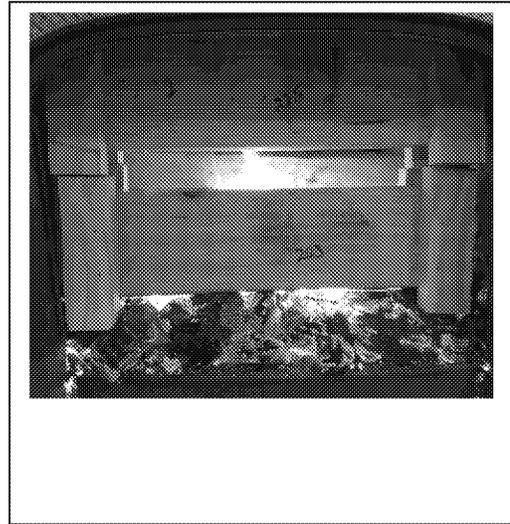


Hearth and Home Technologies Intrepid FlexBurn 2115-CAT

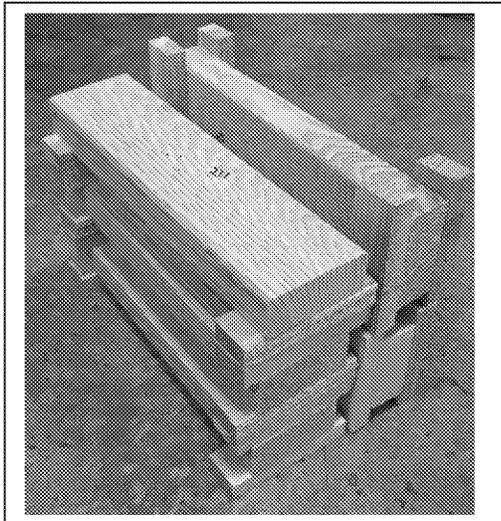
Run 3 – Fuel



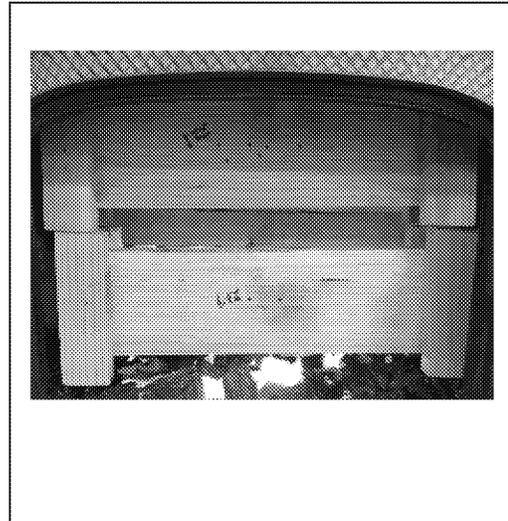
Run 3 – Newly Loaded Stove



Run 4 – Fuel



Run 4 – Newly Loaded Stove



WOOD HEATER DESCRIPTION

Appliance Manufacturer: Hearth and Home Technologies

Wood Stove Model: Intrepid FlexBurn 2115-CAT

Type: Catalytic radiant freestanding

WOOD HEATER INFORMATION

Materials of Construction: The unit is constructed primarily of cast iron. The firebox is lined with refractory brick that measures 12" x 6" x 1.25". The feed door has a 9.4" x 5.88" glass panel and 5/16" gasket.

Air Introduction System: Primary air is controlled by a Bi-metallic spring thermostat located at the right rear of the stove top. Moving the control arm fully to the left opens the air control, fully to the right closes the air. As the spring heats up, it tightens causing the controlling damper to close. Secondary air is un-controlled, it enters the appliance through an opening located at the rear of the stove on the bottom side. Air travels into the refractory secondary combustion system and enters the flame path through orifices in the refractory walls.

Combustion Control Mechanisms: Primary air is controlled by a Bi-metallic spring thermostat located at the right rear of the stove top. Moving the control arm fully to the left opens the air control, fully to the right closes the air. As the coil spring heats up, it tightens causing the controlling damper to close, cooling of the spring loosens the coil and allows the controlling damper to open. Position of the control arm sets the tension of the coil that determines how much heat is needed to cause the control damper to close.

Combustor: Combustor is an Applied Ceramics part number WF-4150001163 metal type with 25 cells per square inch. Outside dimensions of the face are 6.41" x 2.49"; a 430 stainless Steel, 16-gauge can is used to wrap the four outer sides. The combustor is an option to the stove model which is certified as a non-cat to 2020 requirements.

Internal Baffles: An internal baffle is not used; flame path is either directed through a bypass opening or through the refractory combustion chamber.

Other Features: A catalyst bypass is operated by a handle located on the right side of the firebox. The ash pan is accessed through a door located under the front fuel loading door, a top fuel loading door is in the stove top.

Flue Outlet: The 6" diameter flue outlet is located in the top rear of the unit.

WOOD HEATER OPERATING INSTRUCTIONS

Specific Written Instructions: See Section 5 of this report. All markings and instruction materials were reviewed for content prior to printing.

Section 3

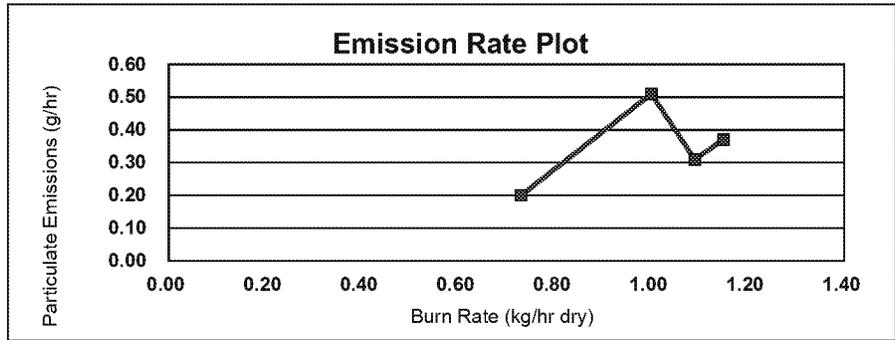
Test Data by Run

EPA Weighted Average Emissions EPA Method 28

Client: Hearth & Home
Stove Model: Intrepid FlexBurn 211:
Test Dates: 1/3/18 - 1/8/18
Project Number: 0135WS038E
Tracking Number: 2264

Status: Final
Stove Type: Catalytic Stove

	Emissions (g/hr):	0.3
Weighted Averages	HHV Efficiency (%):	76.7
	LHV Efficiency (%):	82.8



Run #	2	
Burn Rate (dry kg/hr)	0.73	
Category	1	
LHV Efficiency (%)	84.7	
HHV Efficiency (%)	78.4	
Emissions (g/hr)	0.2	
Weighting Factor	0.380	28.81%

Run #	1	
Burn Rate (dry kg/hr)	1.00	
Category	2	
LHV Efficiency (%)	84.7	
HHV Efficiency (%)	78.4	
Emissions (g/hr)	0.51	
Weighting Factor	0.278	21.11%

Run #	3	
Burn Rate (dry kg/hr)	1.09	
Category	2	
LHV Efficiency (%)	81	
HHV Efficiency (%)	75	
Emissions (g/hr)	0.31	
Weighting Factor	0.110	8.34%

Run #	4	
Burn Rate (dry kg/hr)	1.15	
Category	2	
LHV Efficiency (%)	80.9	
HHV Efficiency (%)	74.9	
Emissions (g/hr)	0.37	
Weighting Factor	0.551	41.74%

Conditioning Data - ASTM E2780/ ASTM E2515

Manufacturer: Hearth & Home
 Model: Intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: April 2017 - November 2017
 Technician: Hearth & Home
 Operation Category: 1 - 3

Elapsed Time (hr)	Flue Gas Temp (° F)	Catalyst Exit Temp (° F)
0		615.0
1		1258.0
2		1250.0
3		1003.0
4		683.0
5		886.0
6		1070.0
7		1636.0
8		828.0
9		676.0
10		1278.0
11		1259.0
12		1151.0
13		779.0
14		1535.0
15		1524.0
16		1159.0
17		907.0
18		1433.0
19		1376.0
20		1668.0
21		822.0
22		781.0
23		940.0
24		1220.0
25		1572.0

Elapsed Time (hr)	Flue Gas Temp (° F)	Catalyst Exit Temp (° F)
26		890.0
27		699.0
28		1353.0
29		1269.0
30		1706.0
31		902.0
32		796.0
33		1479.0
34		1168.0
35		1063.0
36		768.0
37		1334.0
38		1442.0
39		1267.0
40		881.0
41		769.0
42		731.0
43		1115.0
44		1053.0
45		1320.0
46		931.0
47		824.0
48		734.0
49		1184.0
50		1358.0

Technician Signature: 

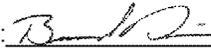
*Model: Intrepid FlexBurn Catalytic
Hearth and Home Technologies
352 Mountain House Road
Halifax, PA 17032*

Run 1

Wood Heater Preburn Data - ASTM E2780

Intrepid IV Catalytic - KJM 2/12/18

Run: 1

Technician Signature: 

Manufacturer: Hearth & Home
 Model: Intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: 1/3/18
 Beginning Clock Time: 10:04

Preburn Fuel Data	
Fuel Piece Lengths (in.):	6
Total Preburn Weight (lb):	13.7
	23.5
Fuel Moisture Readings (% DB):	19.1
	20.8
	23.4
Avg Preburn Moisture (% DB):	21.70

Coal Bed Range (lb):	1.7	2.1
	(min)	(max)

Elapsed Time (min)	Scale (lb)	Stack Draft (in H ₂ O)	Temperatures (°F)							Stack	Ambient
			FB Top	FB Bottom	FB Back	FB Left	FB Right	Avg. FB			
0	9.9	-0.071	404	139	328	237	148	251.2	881	70	
1	9.7	-0.062	419	143	361	241	153	263.4	579	70	
2	9.6	-0.056	413	148	390	246	157	270.8	473	70	
3	9.5	-0.05	405	153	412	251	158	275.8	418	70	
4	9.4	-0.048	397	158	429	255	159	279.6	386	70	
5	9.4	-0.044	388	163	441	259	161	282.4	367	70	
6	9.3	-0.042	382	168	450	263	163	285.2	353	70	
7	9.2	-0.041	378	173	457	266	165	287.8	342	70	
8	9.2	-0.04	376	178	463	269	168	290.8	335	70	
9	9.1	-0.039	377	183	467	271	170	293.6	329	70	
10	9	-0.038	381	188	470	273	172	296.8	324	70	
11	9	-0.038	388	193	472	275	174	300.4	321	70	
12	10	-0.084	384	197	471	276	176	300.8	362	70	
13	8.7	-0.04	376	202	477	278	178	302.2	346	70	
14	8.6	-0.042	370	206	489	280	180	305	346	70	
15	8.5	-0.042	369	210	505	281	182	309.4	350	70	
16	8.3	-0.043	375	214	524	284	184	316.2	357	70	
17	8.2	-0.044	387	218	544	288	186	324.6	361	70	
18	8.1	-0.044	397	221	564	293	188	332.6	366	70	
19	7.9	-0.043	404	224	584	297	190	339.8	367	70	
20	7.8	-0.043	413	227	602	301	192	347	368	70	
21	7.7	-0.043	422	230	618	305	194	353.8	368	70	
22	7.6	-0.043	431	233	631	310	196	360.2	368	70	
23	7.5	-0.042	439	235	644	314	198	366	370	70	
24	7.4	-0.042	447	238	655	319	201	372	368	70	
25	7.3	-0.042	456	240	664	324	203	377.4	367	70	
26	7.2	-0.041	463	242	673	328	206	382.4	369	70	
27	7.1	-0.041	470	244	679	333	208	386.8	366	71	
28	6.9	-0.042	477	246	685	338	211	391.4	368	71	
29	6.8	-0.041	484	247	688	343	214	395.2	367	70	
30	6.7	-0.041	489	248	689	348	216	398	365	71	
31	6.6	-0.047	484	250	683	352	219	397.6	546	71	
32	6.4	-0.045	477	251	685	358	224	399	413	70	
33	6.3	-0.044	476	253	687	361	229	401.2	385	71	
34	6.1	-0.044	476	255	692	364	233	404	377	71	
35	6	-0.042	479	257	699	366	237	407.6	372	70	
36	5.9	-0.042	480	258	708	367	243	411.2	370	71	
37	5.8	-0.041	479	259	716	368	250	414.4	368	70	
38	5.7	-0.041	480	261	722	370	257	418	367	70	

Wood Heater Preburn Data - ASTM E2780

Intrepid IV Catalytic - KJM 2/12/18

Technician Signature: *B. [Signature]*

Run: 1

Manufacturer: Hearth & Home
 Model: Intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: 1/3/18
 Beginning Clock Time: 10:04

Preburn Fuel Data	
Fuel Piece Lengths (in.):	<u>6</u>
Total Preburn Weight (lb):	<u>13.7</u>
	<u>23.5</u>
Fuel Moisture Readings (% DB):	<u>19.1</u>
	<u>20.8</u>
	<u>23.4</u>
Avg Preburn Moisture (% DB):	<u>21.70</u>

Coal Bed Range (lb):	1.7	2.1
	(min)	(max)

Elapsed Time (min)	Scale (lb)	Stack Draft (in H ₂ O)	Temperatures (°F)							
			FB Top	FB Bottom	FB Back	FB Left	FB Right	Avg. FB	Stack	Ambient
39	5.6	-0.041	484	262	729	371	264	422	364	70
40	5.5	-0.04	484	263	734	371	271	424.6	364	71
41	5.4	-0.04	492	264	740	372	278	429.2	363	70
42	5.2	-0.041	501	265	744	373	285	433.6	363	70
43	5.2	-0.04	503	266	748	373	291	436.2	361	70
44	5.1	-0.039	504	267	750	373	298	438.4	359	71
45	5	-0.038	505	268	752	373	305	440.6	356	70
46	4.9	-0.039	507	269	754	373	312	443	356	70
47	4.8	-0.039	509	269	757	373	318	445.2	355	70
48	4.7	-0.039	511	270	759	373	324	447.4	353	70
49	4.6	-0.038	515	271	760	373	330	449.8	353	70
50	4.5	-0.038	514	272	761	372	336	451	349	71
51	15.5	-0.124	512	272	758	372	341	451	518	71
52	4.2	-0.043	507	273	760	374	347	452.2	441	71
53	4.1	-0.042	514	274	760	375	351	454.8	382	71
54	4	-0.039	519	274	762	377	354	457.2	360	71
55	3.9	-0.039	522	275	765	378	357	459.4	351	71
56	3.8	-0.038	525	276	768	379	360	461.6	344	71
57	3.7	-0.037	525	276	771	381	362	463	340	71
58	3.6	-0.037	525	277	774	382	363	464.2	338	71
59	3.5	-0.038	523	277	775	383	365	464.6	334	71
60	3.5	-0.035	521	278	777	385	366	465.4	333	71
61	3.4	-0.035	513	279	777	388	366	464.6	331	71
62	3.3	-0.035	511	280	777	391	367	465.2	329	71
63	3.2	-0.034	510	281	775	393	367	465.2	325	71
64	3.2	-0.034	508	281	774	394	367	464.8	322	71
65	3.1	-0.033	505	282	771	396	367	464.2	321	71
66	3.1	-0.033	505	283	767	397	367	463.8	319	71
67	3	-0.033	506	284	763	398	367	463.6	318	71
68	3	-0.033	506	285	757	399	366	462.6	316	71
69	3	-0.032	504	286	751	400	366	461.4	313	71
70	2.9	-0.032	503	287	745	402	366	460.6	311	71
71	2.3	-0.06	498	289	736	403	365	458.2	409	71
72	2.8	-0.033	510	290	730	402	365	459.4	346	71
73	2.8	-0.032	529	291	724	402	365	462.2	323	72
74	2.7	-0.031	536	293	718	403	365	463	314	71
75	2.7	-0.03	537	294	713	403	365	462.4	309	71
76	2.7	-0.029	534	295	707	403	365	460.8	308	72
77	2.6	-0.029	529	296	701	403	365	458.8	306	71

Wood Heater Preburn Data - ASTM E2780

Run: 1

Intrepid IV Catalytic - KJM 2/12/18

Technician Signature: *R. [Signature]*

Manufacturer: Hearth & Home
 Model: Intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: 1/3/18
 Beginning Clock Time: 10:04

Preburn Fuel Data	
Fuel Piece Lengths (in.):	6
Total Preburn Weight (lb):	13.7
	23.5
Fuel Moisture Readings (% DB):	19.1
	20.8
	23.4
Avg Preburn Moisture (% DB):	21.70

Coal Bed Range (lb):	1.7 (min)	2.1 (max)
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Elapsed Time (min)	Scale (lb)	Stack Draft (in H ₂ O)	Temperatures (°F)							Stack	Ambient
			FB Top	FB Bottom	FB Back	FB Left	FB Right	Avg. FB			
78	2.6	-0.029	523	298	695	404	365	457	303	71	
79	2.6	-0.028	522	299	687	403	365	455.2	302	71	
80	2.6	-0.028	520	301	680	403	365	453.8	300	71	
81	2.5	-0.027	518	302	673	403	366	452.4	298	71	
82	2.5	-0.027	515	304	666	403	366	450.8	296	71	
83	2.5	-0.026	512	305	658	402	366	448.6	296	72	
84	2.5	-0.027	509	307	651	402	366	447	295	72	
85	2.4	-0.027	507	308	644	402	367	445.6	295	72	
86	2.4	-0.026	503	310	636	401	367	443.4	293	72	
87	2.4	-0.026	502	311	628	401	366	441.6	290	71	
88	2.4	-0.026	501	313	621	400	367	440.4	288	72	
89	2.4	-0.025	498	315	614	399	367	438.6	286	72	
90	2.3	-0.024	497	316	607	399	367	437.2	285	72	
91	2.1	-0.027	497	318	598	399	367	435.8	343	72	
92	2.1	-0.025	498	319	593	398	367	435	299	72	
93	2.1	-0.025	500	321	588	398	368	435	284	72	
94	2	-0.025	499	322	584	398	368	434.2	279	72	
95	2	-0.023	495	324	580	398	368	433	275	72	
96	2	-0.023	493	325	576	398	368	432	273	72	
97	2	-0.022	492	326	573	398	368	431.4	271	72	

Wood Heater Test Fuel Data - ASTM E2780

Manufacturer: **Hearth & Home**
 Model: **Intrepid IV Catalytic** ----- Intrepid IV Catalytic - KJM 2/12/18
 Tracking No.: **2264**
 Project No.: **0135WS038E**
 Test Date: **1/3/2018**
 Run No.: **1**

Firebox Volume (ft ³):	1.31
Fuel Piece Length (in):	13.5
2x4 Crib Weight (lb):	8.5
4x4 Crib Weight (lb):	0

Total Fuel Weight (Dry Basis, lb):	7.2	
Fuel Density (lb/ft ³ , Dry Basis):	25.96	OK
Loading Density (lb/ft ³ , Wet Basis):	6.49	OK
2x4 Percentage:	N/A	N/A

Coal Bed Range (20-25%): **1.7 - 2.125**

Test Fuel Piece	Weight (lb)	Size	Readings (Dry Basis %)			Dry Weight (lb)
1	1.3	2"x 4"	21.3	20.6	19.7	1.08
2	1.3	2"x 4"	22.5	21.3	20.0	1.07
3	1.2	2"x 4"	19.9	19.7	19.0	1.00
4	1.2	2"x 4"	18.9	19.3	19.2	1.01
5	1.4	2"x 4"	20.8	19.5	21.4	1.16

Spacer Readings (Dry Basis %)			
10.0	8.0		
10.5	15.2		
11.3	15.6		
11.4	8.0		
14.9	7.8		
14.8			
10.8			
7.5			
14.9			
15.2			
13.0			
14.8			
11.2			

Technician Signature: 

Wood Heater Test Data - ASTM E2780 / ASTM E2515

Run: 1

Manufacturer: Hearth & Home Intrepid IV Catalytic - KJM 2/12/18
 Model: Intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: 03-Jan-18
 Beginning Clock Time: 10:43 Background Sample Volume: _____ cubic feet
 Total Sampling Time: 195 min
 Recording Interval: 1 min
 Meter Box Y Factor: 0.981 (1) 0.984 (2) _____ (Amb)

PM Control Modules: 2035_0036
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Dilution Tunnel H₂O: 2.00 percent
 Dilution Tunnel Static: -0.180 "H₂O
 Tunnel Area: 0.19635 ft²
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 13.15 ft/sec.
 Initial Tunnel Flow: 143.8 scfm
 Average Tunnel Flow: 146.4 scfm
 Post-Test Leak Check (1): 0.000 cfm @ 6 in. Hg
 Post-Test Leak Check (2): 0.000 cfm @ 7 in. Hg
 Average Test Piece Fuel Moisture: 20.21 Dry Basis %

Technician Signature: B. [Signature]

Barometric Pressure: Begin Middle End Average
30.19 30.16 30.14 30.16 "Hg

OMNI Equipment Numbers: _____

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.026	0.046	0.038	0.030	0.030	0.048	0.050	0.030	0.049
Temp:	96	93	93	93	92	92	92	92	93
V _{straw}	13.16			ft/sec			V _{scant}	14.95	
				ft/sec			F _p	0.880	

Elapsed Time (min)	Particulate Sampling Data													Fuel Weight (lb)		Temperature Data (°F)													Stack Gas Data			
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter 1 Temp (°F)	Meter 1 Vacuum ("Hg)	Orifice dH 2 ("H ₂ O)	Meter 2 Temp (°F)	Meter 2 Vacuum ("Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Avg. Stove Surface	Catalyst Exit	Stack	Filter 1	Dryer Exit 1	Filter 2	Dryer Exit 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
0	0.000	0.000			0.04	74	1.84	0.49	75	0.9	95	0.049			8.5		486	328	562	398	367	428	897	265	70	67	70	67	72	-0.022	8.59	0
1	0.161	0.155	0.16	0.16	1.33	74	2	1.09	74	1.1	125	0.049	103	100	8.5	0	475	329	556	398	367	425	879	261	71	71	71	69	72	-0.048	8.59	0
2	0.323	0.314	0.16	0.16	1.35	74	1.99	1.16	75	1.1	98	0.049	101	100	8.4	-0.1	454	329	554	396	366	420	995	255	71	72	71	69	72	-0.023	8.59	0
3	0.485	0.478	0.16	0.16	1.33	74	1.98	1.16	75	1.1	92	0.049	101	102	8.3	-0.1	439	329	555	394	365	416	1042	252	71	72	71	69	71	-0.025	8.59	0.1
4	0.646	0.639	0.16	0.16	1.34	74	1.98	1.16	75	1.1	91	0.049	100	100	8.3	0	425	329	557	392	363	413	1067	254	71	72	71	69	72	-0.025	8.59	0.01
5	0.808	0.802	0.16	0.16	1.34	74	1.97	1.16	75	1.1	90	0.049	101	101	8.3	0	416	330	561	391	362	412	1073	258	71	72	71	69	71	-0.025	8.59	0.01
6	0.970	0.964	0.16	0.16	1.34	74	1.97	1.16	75	1.1	89	0.049	101	101	8.2	-0.1	405	330	565	389	360	410	1085	261	72	72	72	69	72	-0.027	8.47	0.01
7	1.132	1.127	0.16	0.16	1.33	75	1.98	1.16	75	1.1	90	0.049	100	101	8.1	-0.1	396	330	571	387	358	408	1089	265	72	72	72	69	71	-0.027	8.4	0.01
8	1.294	1.289	0.16	0.16	1.32	75	1.98	1.15	75	1.1	90	0.049	100	101	8.1	0	389	330	577	385	355	407	1086	272	72	72	72	69	71	-0.027	8.09	0.01
9	1.455	1.451	0.16	0.16	1.33	75	1.97	1.16	75	1.1	90	0.049	100	101	8.0	-0.1	382	329	583	383	352	406	1094	275	72	72	72	69	71	-0.028	8.31	0.01
10	1.615	1.613	0.16	0.16	1.33	75	1.97	1.16	75	1.1	90	0.049	99	101	7.9	-0.1	382	329	588	380	349	406	1100	278	72	72	72	69	71	-0.029	8.35	0.01
11	1.777	1.776	0.16	0.16	1.33	75	1.96	1.15	75	1.1	90	0.049	100	101	7.9	0	380	328	593	378	347	405	1100	280	72	72	72	69	72	-0.030	8.02	0.03
12	1.939	1.938	0.16	0.16	1.33	75	1.96	1.15	75	1.1	90	0.049	100	101	7.8	-0.1	381	328	598	375	344	405	1105	283	72	72	72	69	71	-0.029	8.2	0.01
13	2.099	2.099	0.16	0.16	1.31	75	1.96	1.15	75	1.1	91	0.049	99	100	7.7	-0.1	388	328	603	372	341	406	1113	288	72	72	72	69	71	-0.031	8.73	0.02
14	2.260	2.261	0.16	0.16	1.31	75	1.96	1.15	76	1.1	91	0.049	100	101	7.7	0	390	327	608	369	338	406	1110	290	72	72	72	69	72	-0.031	8.21	0.07
15	2.421	2.423	0.16	0.16	1.32	75	1.96	1.15	76	1.1	91	0.049	100	101	7.6	-0.1	392	326	611	366	336	406	1105	291	72	72	72	69	72	-0.031	8.07	0.06
16	2.582	2.586	0.16	0.16	1.32	76	1.95	1.14	76	1.1	90	0.049	100	101	7.5	-0.1	395	326	615	363	333	406	1112	295	72	72	72	69	71	-0.033	8.72	0.03
17	2.743	2.747	0.16	0.16	1.31	76	1.96	1.14	76	1.1	91	0.049	100	100	7.4	-0.1	401	325	619	361	330	407	1148	300	72	72	72	69	71	-0.034	9.74	0.04
18	2.903	2.909	0.16	0.16	1.31	76	1.96	1.14	76	1.1	92	0.049	99	101	7.3	-0.1	413	324	623	358	328	409	1150	303	72	72	72	69	71	-0.033	9.63	0.03
19	3.064	3.071	0.16	0.16	1.31	76	1.96	1.14	76	1.1	91	0.049	100	101	7.2	-0.1	423	324	627	356	328	411	1153	305	73	72	72	69	71	-0.032	9.37	0.03
20	3.225	3.233	0.16	0.16	1.32	76	1.96	1.14	77	1.1	92	0.049	100	101	7.1	-0.1	429	322	632	353	324	412	1181	305	73	72	72	69	71	-0.034	10.06	0.02
21	3.386	3.394	0.16	0.16	1.31	76	1.96	1.14	77	1.1	92	0.049	100	100	7.1	0	431	322	637	351	322	413	1201	307	73	72	72	69	72	-0.034	10.17	0.01
22	3.547	3.556	0.16	0.16	1.31	77	1.96	1.14	77	1.1	92	0.049	100	101	7.0	-0.1	432	321	642	348	320	413	1217	311	73	72	72	69	71	-0.035	10.27	0.01
23	3.707	3.718	0.16	0.16	1.31	77	1.96	1.14	77	1.1	93	0.049	99	101	6.9	-0.1	431	320	648	347	318	413	1232	311	73	72	72	69	71	-0.034	10.44	0.02
24	3.868	3.880	0.16	0.16	1.31	77	1.96	1.14	77	1.1	93	0.049	100	101	6.8	-0.1	427	319	655	344	316	412	1255	314	73	72	73	69	72	-0.035	11.06	0.03
25	4.030	4.041	0.16	0.16	1.31	77	1.97	1.14	77	1.1	93	0.049	100	100	6.7	-0.1	424	318	662	342	315	412	1234	317	73	72	73	69	71	-0.035	10.1	0.01
26	4.191	4.203	0.16	0.16	1.31	77	1.96	1.14	77	1.1	93	0.049	100	101	6.6	-0.1	421	317	667	341	313	412	1217	318	73	72	73	69	72	-0.035	9.56	0.01
27	4.351	4.365	0.16	0.16	1.31	77	1.96	1.14	78	1.1	93	0.049	99	101	6.5	-0.1	419	316	672	340	312	412	1216	318	73	72	73	69	71	-0.036	9.45	0.01
28	4.512	4.527	0.16	0.16	1.32	78	1.96	1.13	78	1.1	93	0.049	100	101	6.4	-0.1	419	315	676	338	310	412	1215	319	73	72	73	69	72	-0.035	9.41	0.01
29	4.673	4.688	0.16	0.16	1.32	78	1.96	1.14	78	1.1	93	0.049	100	100	6.4	0	422	314	680	337	309	412	1216	318	73	73	73	69	71	-0.035	9.39	0.01
30	4.835	4.850	0.16	0.16	1.31	78	1.96	1.14	78	1.1	94	0.049	100	101	6.3	-0.1	426	313	683	336	307	413	1246	318	73	73	73	69	72	-0.035	10.22	0.02
31	4.996	5.013	0.16	0.16	1.31	78	1.97	1.14	78	1.1	94	0.049	100	101	6.2	-0.1	430	312	686	335	306	414	1255	322	73	73	73	69	72	-0.035	10.34	0.01
32	5.157	5.174	0.16	0.16	1.31	78	1.96	1.14	78	1.1	94	0.049	100	100	6.1	-0.1	437	311	690	335	305	416	1273	322	74	73	73	69	72	-0.036	10.54	0.01
33	5.318	5.336	0.16	0.16	1.31	78	1.95	1.14	78	1.1	94	0.049	100	101	6.0	-0.1	441	310	694	334	304	417	1301	323	74	73	73	69	71	-0.036	11.12	0.03
34	5.479	5.498	0.16	0.16	1.32	78	1.97	1.14	79	1.1	94	0.049	100	100	5.9	-0.1	446	309	699	334	303	418	1324	325	74	73	73	69	72	-0.035	11.37	0.03
35	5.641	5.660	0.16	0.16	1.31	79	1.97	1.14	79	1.1	94	0.049	100	100	5.8	-0.1	450	308	705	333	302	420	1326	326	74	73	73	70	72	-0.037	11.19	0.03
36	5.802	5.822	0.16	0.16	1.31	79	1.96	1.14	79	1.1	94	0.049	99	100	5.8	0	454	307	711	333	301	421	1324	325	74	73	73	70	72	-0.037	11.26	0.08

Wood Heater Test Data - ASTM E2780 / ASTM E2515

Run: 1

Manufacturer: Hearth & Home Intrepid IV Catalytic - KJM 2/12/18

Model: Intrepid IV Catalytic

Tracking No.: 2264

Project No.: 0135WS038E

Test Date: 03-Jan-18

Beginning Clock Time: 10:43

Total Sampling Time: 195 min

Recording Interval: 1 min

Background Sample Volume: _____ cubic feet

Meter Box Y Factor: 0.981 (1) 0.984 (2) _____ (Amb)

Barometric Pressure: Begin Middle End Average

30.19 30.16 30.14 30.16 "Hg

OMNI Equipment Numbers: _____

PM Control Modules: 0035_0036
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Dilution Tunnel H₂O: 2.00 percent
 Dilution Tunnel Static: -0.180 "H₂O
 Tunnel Area: 0.19635 ft²
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 13.15 ft/sec.
 Initial Tunnel Flow: 143.8 scfm
 Average Tunnel Flow: 146.4 scfm
 Post-Test Leak Check (1): 0.000 cfm @ 6 in. Hg
 Post-Test Leak Check (2): 0.000 cfm @ 7 in. Hg
 Average Test Piece Fuel Moisture: 20.21 Dry Basis %

Technician Signature: *[Signature]*

Velocity Traverse Data										
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center	
Initial dP	0.026	0.046	0.038	0.030	0.030	0.048	0.050	0.030	0.049	
Temp	96	93	93	93	92	92	92	92	93	
<i>V_{straw}</i>	<u>13.16</u> ft/sec			<i>V_{scan}</i>			<u>14.95</u> ft/sec		<i>F_p</i>	<u>0.880</u>

Elapsed Time (min)	Particulate Sampling Data													Fuel Weight (lb)		Temperature Data (°F)													Stack Gas Data			
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter 1 Temp (°F)	Meter 1 Vacuum ("Hg)	Orifice dH 2 ("H ₂ O)	Meter 2 Temp (°F)	Meter 2 Vacuum ("Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Avg. Stove Surface	Catalyst Exit	Stack	Filter 1	Dryer Exit 1	Filter 2	Dryer Exit 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
37	5.963	5.983	0.16	0.16	1.34	79	1.99	1.14	79	1.1	94	0.049	99	100	5.7	-0.1	458	306	715	333	300	422	1321	322	74	73	73	70	72	-0.035	10.84	0.24
38	6.125	6.145	0.16	0.16	1.34	79	1.99	1.14	79	1.1	93	0.049	100	100	5.6	-0.1	461	305	720	332	300	424	1323	320	74	73	73	70	72	-0.036	11.1	0.22
39	6.288	6.308	0.16	0.16	1.34	79	1.99	1.14	79	1.1	93	0.049	101	101	5.5	-0.1	465	304	724	332	299	425	1322	320	74	73	73	70	72	-0.035	10.84	0.16
40	6.452	6.470	0.16	0.16	1.34	79	1.99	1.14	79	1.1	93	0.049	101	100	5.4	-0.1	467	304	728	332	299	426	1322	319	74	73	73	70	72	-0.034	10.95	0.21
41	6.615	6.632	0.16	0.16	1.33	79	1.99	1.14	79	1.1	93	0.049	101	100	5.3	-0.1	473	303	730	332	298	427	1324	318	74	73	73	70	71	-0.036	10.66	0.29
42	6.778	6.794	0.16	0.16	1.33	79	1.99	1.14	80	1.1	94	0.049	101	100	5.3	0	477	302	733	332	298	428	1328	318	74	73	73	70	72	-0.035	10.69	0.26
43	6.940	6.956	0.16	0.16	1.34	79	2	1.14	80	1.1	94	0.049	100	100	5.2	-0.1	484	301	736	332	297	430	1328	320	74	73	73	70	72	-0.036	10.97	0.21
44	7.103	7.118	0.16	0.16	1.34	80	1.99	1.14	80	1.1	94	0.049	100	100	5.1	-0.1	484	300	738	332	297	430	1339	324	74	73	74	70	72	-0.036	11.49	0.03
45	7.266	7.280	0.16	0.16	1.34	80	2	1.13	80	1.1	94	0.049	100	100	5.0	-0.1	489	299	741	333	297	432	1362	324	74	73	74	70	72	-0.036	11.75	0.06
46	7.429	7.442	0.16	0.16	1.34	80	1.99	1.14	80	1.1	94	0.049	100	100	4.9	-0.1	496	299	744	333	297	434	1357	326	74	73	74	70	72	-0.035	11.76	0.11
47	7.592	7.604	0.16	0.16	1.34	80	1.99	1.14	80	1.1	94	0.049	100	100	4.8	-0.1	507	298	747	334	297	437	1352	325	74	73	74	70	71	-0.037	11.84	0.06
48	7.756	7.767	0.16	0.16	1.34	80	1.99	1.14	80	1.1	95	0.049	101	101	4.7	-0.1	515	297	751	334	297	439	1380	328	74	73	74	70	71	-0.036	11.59	0.38
49	7.919	7.929	0.16	0.16	1.34	80	1.99	1.14	80	1.1	95	0.049	101	100	4.6	-0.1	520	297	754	335	298	441	1366	328	74	73	74	70	72	-0.037	11.82	0.39
50	8.082	8.091	0.16	0.16	1.33	80	2	1.14	80	1.1	95	0.049	101	100	4.5	-0.1	525	296	756	336	298	442	1383	328	74	73	74	70	72	-0.037	12.1	0.64
51	8.245	8.253	0.16	0.16	1.33	80	2	1.14	81	1.1	95	0.049	101	100	4.4	-0.1	528	295	759	337	299	444	1402	329	74	73	74	70	72	-0.037	12.76	0.68
52	8.408	8.416	0.16	0.16	1.34	80	1.99	1.14	81	1.1	95	0.049	101	101	4.4	0	535	294	763	338	300	446	1414	330	74	73	74	70	72	-0.037	12.7	0.6
53	8.571	8.578	0.16	0.16	1.34	80	1.99	1.14	81	1.1	95	0.049	101	100	4.2	-0.2	540	294	766	339	301	448	1409	331	74	73	74	70	72	-0.036	12.33	0.65
54	8.734	8.740	0.16	0.16	1.34	80	2	1.14	81	1.1	95	0.049	101	100	4.2	0	542	293	769	340	302	448	1419	332	74	73	74	70	72	-0.037	13.03	0.28
55	8.897	8.902	0.16	0.16	1.34	81	2	1.14	81	1.1	94	0.049	100	100	4.1	-0.1	544	293	772	341	303	451	1405	330	74	73	74	70	72	-0.037	12.5	0.73
56	9.062	9.065	0.16	0.16	1.33	81	1.99	1.14	81	1.1	94	0.049	101	101	4.0	-0.1	548	292	775	342	304	452	1404	328	74	73	74	70	71	-0.037	12.66	0.35
57	9.225	9.227	0.16	0.16	1.34	81	1.99	1.14	81	1.1	95	0.049	100	100	3.9	-0.1	551	291	778	343	306	454	1415	330	74	73	74	70	72	-0.036	12.43	0.57
58	9.388	9.389	0.16	0.16	1.34	81	2	1.14	81	1.2	95	0.049	100	100	3.8	-0.1	551	291	781	344	307	455	1432	331	74	73	74	70	72	-0.036	13.11	0.32
59	9.551	9.552	0.16	0.16	1.33	81	2	1.14	81	1.2	95	0.049	100	101	3.7	-0.1	553	290	784	345	308	456	1434	331	74	73	74	70	72	-0.036	12.96	0.67
60	9.714	9.714	0.16	0.16	1.34	81	1.99	1.14	81	1.1	95	0.049	100	100	3.6	-0.1	556	290	786	346	310	458	1443	330	74	74	74	70	72	-0.037	12.97	0.44
61	9.880	9.877	0.17	0.16	1.38	81	1.89	1.14	81	1.1	95	0.049	102	101	3.5	-0.1	558	289	789	347	311	459	1442	330	75	74	74	70	72	-0.036	13.13	0.83
62	10.044	10.039	0.16	0.16	1.34	81	1.98	1.13	81	1.1	95	0.049	101	100	3.4	-0.1	561	289	792	348	313	461	1441	329	76	74	74	70	72	-0.036	12.77	0.38
63	10.208	10.201	0.16	0.16	1.35	81	1.98	1.14	82	1.1	95	0.049	101	100	3.3	-0.1	563	288	795	349	314	462	1448	329	76	74	74	70	72	-0.035	12.6	0.74
64	10.371	10.363	0.16	0.16	1.35	81	1.98	1.14	82	1.1	95	0.049	100	100	3.2	-0.1	567	288	798	350	316	464	1458	331	76	74	74	70	72	-0.037	13.1	0.56
65	10.535	10.527	0.16	0.16	1.35	81	1.99	1.14	82	1.1	96	0.049	101	101	3.2	0	568	287	801	352	317	465	1470	332	76	74	74	70	72	-0.036	13.27	0.55
66	10.700	10.688	0.16	0.16	1.35	81	1.98	1.13	82	1.1	95	0.049	102	99	3.1	-0.1	569	287	804	353	318	466	1475	332	76	74	74	70	72	-0.036	13.37	0.56
67	10.864	10.850	0.16	0.16	1.35	81	1.98	1.14	82	1.1	95	0.049	101	100	3.0	-0.1	571	287	808	354	320	468	1474	333	76	74	74	70	72	-0.037	13.42	0.47
68	11.027	11.012	0.16	0.16	1.34	82	1.99	1.14	82	1.2	95	0.049	100	100	2.9	-0.1	573	286	811	356	322	470	1475	331	76	74	74	70	72	-0.037	13.46	0.39
69	11.191	11.175	0.16	0.16	1.34	82	1.98	1.14	82	1.1	96	0.049	101	101	2.8	-0.1	577	286	814	357	323	471	1486	333	76	74	74	70	72	-0.036	13.33	0.32
70	11.355	11.337	0.16	0.16	1.34	82	1.99	1.14	82	1.1	96	0.049	101	100	2.7	-0.1	580	285	816	358	325	473	1444	331	76	74	74	70	72	-0.036	12.74	0.16
71	11.518	11.499	0.16	0.16	1.35	82	1.98	1.14	82	1.1	96	0.049	100	100	2.6	-0.1	583	285	817	360	327	474	1423	330	76	74	74	70	72	-0.035	12.37	0.39
72	11.682	11.661	0.16	0.16	1.34	82	1.98	1.14	82	1.1	95	0.049	101	100	2.6	0	585	285	817	361	328	475	1412	329	76	74	74	70	72	-0.035	11.71	0.23
73	11.846	11.824	0.16	0.16	1.35	82	1.98	1.14	82	1.1	95	0.049	101	101	2.5	-0.1	584	284														

Wood Heater Test Data - ASTM E2780 / ASTM E2515

Run: 1

Manufacturer: Hearth & Home Intrepid IV Catalytic - KJM 2/12/18
 Model: Intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: 03-Jan-18
 Beginning Clock Time: 10:43
 Total Sampling Time: 195 min
 Recording Interval: 1 min
 Background Sample Volume: cubic feet
 Meter Box Y Factor: 0.981 (1) 0.984 (2) (Amb)
 Barometric Pressure: Begin Middle End Average
30.19 30.16 30.14 30.16 "Hg
 OMNI Equipment Numbers:

PM Control Modules: 0035_0036
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Dilution Tunnel H2O: 2.00 percent
 Dilution Tunnel Static: -0.180 "H2O
 Tunnel Area: 0.18635 ft²
 Pitot Tube Cp: 0.98

Avg. Tunnel Velocity: 13.15 ft/sec
 Initial Tunnel Flow: 143.8 scfm
 Average Tunnel Flow: 146.4 scfm
 Post-Test Leak Check (1): 0.000 cfm @ 6 in. Hg
 Post-Test Leak Check (2): 0.000 cfm @ 7 in. Hg
 Average Test Piece Fuel Moisture: 20.21 Dry Basis %

Technician Signature: *B. [Signature]*

Velocity Traverse Data										
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center	
Initial dP	0.026	0.046	0.038	0.030	0.030	0.048	0.050	0.030	0.049	
Temp	96	93	93	93	92	92	92	92	93	
<i>V_{straw}</i>	13.16			<i>V_{scan}</i>			14.95		<i>F_p</i>	0.880
			ft/sec						ft/sec	

Elapsed Time (min)	Particulate Sampling Data											Fuel Weight (lb)		Temperature Data (°F)											Stack Gas Data							
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter 1 Temp (°F)	Meter 1 Vacuum ("Hg)	Orifice dH 2 ("H ₂ O)	Meter 2 Temp (°F)	Meter 2 Vacuum ("Hg)	Dilution Tunnel ("F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Avg. Stove Surface	Catalyst Exit	Stack	Filter 1	Dryer Exit 1	Filter 2	Dryer Exit 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
74	12.010	11.987	0.16	0.16	1.35	82	1.98	1.14	82	1.1	95	0.049	101	101	2.5	0	583	284	816	364	332	476	1382	325	76	74	74	70	72	-0.035	10.97	0.22
75	12.174	12.149	0.16	0.16	1.35	82	1.99	1.14	82	1.2	95	0.049	101	100	2.4	-0.1	580	284	814	365	333	475	1382	324	75	74	74	70	72	-0.034	10.65	0.13
76	12.338	12.311	0.16	0.16	1.35	82	1.97	1.14	82	1.2	95	0.049	101	100	2.3	-0.1	578	284	812	366	334	475	1341	322	75	74	74	70	72	-0.033	10.66	0.05
77	12.503	12.473	0.17	0.16	1.35	82	1.97	1.14	82	1.1	95	0.049	101	100	2.3	0	576	283	809	368	335	474	1333	321	75	74	74	70	72	-0.033	10.59	0.02
78	12.667	12.637	0.16	0.16	1.34	82	1.99	1.14	82	1.1	95	0.049	101	101	2.2	-0.1	574	283	807	369	336	474	1319	319	75	74	74	70	72	-0.033	10.39	0.02
79	12.831	12.798	0.16	0.16	1.34	82	1.98	1.14	83	1.2	95	0.049	101	99	2.2	0	574	283	804	371	338	474	1315	318	75	74	74	71	72	-0.033	10.7	0.01
80	12.995	12.961	0.16	0.16	1.32	82	1.96	1.14	83	1.1	95	0.049	101	100	2.1	-0.1	571	282	800	373	339	473	1294	316	75	74	74	70	72	-0.034	9.93	0.01
81	13.157	13.123	0.16	0.16	1.33	82	1.95	1.14	83	1.2	94	0.049	99	100	2.1	0	567	282	797	376	339	472	1286	314	75	74	74	71	72	-0.033	9.24	0.01
82	13.320	13.286	0.16	0.16	1.33	82	1.96	1.14	83	1.2	94	0.049	100	100	2.0	-0.1	566	282	793	378	340	472	1240	315	75	74	74	71	72	-0.032	9.02	0.01
83	13.483	13.448	0.16	0.16	1.33	82	1.95	1.14	83	1.1	94	0.049	100	100	2.0	0	565	282	787	381	341	471	1202	313	75	74	74	71	72	-0.031	8.14	0.01
84	13.646	13.610	0.16	0.16	1.33	82	1.95	1.14	83	1.1	94	0.049	100	100	2.0	0	563	282	781	383	341	470	1171	312	75	74	74	71	72	-0.031	7.79	0.01
85	13.809	13.773	0.16	0.16	1.32	82	1.96	1.14	83	1.2	94	0.049	100	100	1.9	-0.1	562	282	774	385	342	469	1144	311	75	74	74	71	72	-0.031	7.62	0.01
86	13.973	13.935	0.16	0.16	1.33	82	1.95	1.14	83	1.1	94	0.049	101	100	1.9	0	560	282	766	388	342	468	1120	310	75	74	74	71	72	-0.030	7.63	0.01
87	14.135	14.099	0.16	0.16	1.32	82	1.95	1.13	83	1.1	93	0.049	99	101	1.9	0	556	282	758	389	343	466	1097	307	75	74	74	71	72	-0.030	7.19	0.02
88	14.298	14.261	0.16	0.16	1.32	82	1.96	1.14	83	1.1	94	0.049	100	100	1.9	0	554	282	750	391	344	464	1078	305	75	74	74	71	72	-0.029	7.15	0.03
89	14.461	14.423	0.16	0.16	1.32	82	1.96	1.14	83	1.1	94	0.049	100	100	1.9	0	552	282	741	393	345	463	1062	303	75	74	74	71	72	-0.030	7.05	0.04
90	14.624	14.586	0.16	0.16	1.33	82	1.95	1.14	83	1.1	93	0.049	100	100	1.8	-0.1	549	282	732	394	345	460	1046	303	75	74	74	70	72	-0.028	6.98	0.04
91	14.787	14.748	0.16	0.16	1.33	83	1.95	1.14	83	1.1	93	0.049	100	100	1.8	0	547	282	724	396	346	459	1030	301	75	74	74	70	72	-0.029	6.86	0.03
92	14.950	14.911	0.16	0.16	1.33	83	1.95	1.14	83	1.1	93	0.049	100	100	1.8	0	545	282	715	397	346	457	1018	299	75	74	74	70	72	-0.028	6.87	0.03
93	15.114	15.073	0.16	0.16	1.32	83	1.96	1.14	83	1.1	93	0.049	100	100	1.8	0	544	282	707	398	347	456	1006	296	75	74	74	70	72	-0.028	6.85	0.04
94	15.277	15.235	0.16	0.16	1.33	83	1.96	1.14	83	1.1	93	0.049	100	100	1.8	0	541	282	699	399	347	454	994	295	75	74	74	70	72	-0.027	6.71	0.04
95	15.440	15.398	0.16	0.16	1.32	83	1.95	1.14	83	1.1	92	0.049	100	100	1.7	-0.1	539	283	691	401	347	452	983	295	75	73	74	70	72	-0.027	6.73	0.06
96	15.603	15.562	0.16	0.16	1.32	83	1.96	1.13	83	1.1	93	0.049	100	101	1.7	0	536	283	683	402	348	450	973	295	75	73	74	70	72	-0.027	6.6	0.07
97	15.766	15.724	0.16	0.16	1.33	83	1.95	1.14	83	1.1	92	0.049	100	99	1.7	0	535	283	675	402	348	449	964	293	75	73	74	70	72	-0.027	6.51	0.08
98	15.929	15.886	0.16	0.16	1.33	83	1.95	1.14	83	1.1	93	0.049	100	100	1.7	0	535	283	668	403	349	448	954	292	75	73	74	70	72	-0.028	6.56	0.07
99	16.092	16.049	0.16	0.16	1.33	83	1.95	1.14	83	1.1	92	0.049	100	100	1.7	0	535	284	662	404	349	447	945	290	75	73	74	70	72	-0.026	6.43	0.08
100	16.255	16.211	0.16	0.16	1.33	83	1.95	1.14	83	1.1	93	0.049	100	100	1.7	0	534	284	655	405	350	446	937	289	75	73	74	70	72	-0.027	6.45	0.09
101	16.419	16.374	0.16	0.16	1.32	83	1.95	1.14	83	1.1	92	0.049	100	100	1.6	-0.1	531	285	649	405	350	444	931	289	75	73	74	70	72	-0.025	6.39	0.11
102	16.582	16.536	0.16	0.16	1.33	83	1.95	1.14	83	1.1	91	0.049	100	99	1.6	0	528	285	643	406	351	443	924	287	75	73	74	70	72	-0.026	6.34	0.12
103	16.746	16.699	0.16	0.16	1.32	83	1.95	1.14	83	1.1	91	0.049	100	100	1.6	0	527	285	636	406	351	441	919	285	75	73	74	70	72	-0.026	6.17	0.14
104	16.908	16.862	0.16	0.16	1.33	83	1.96	1.14	83	1.1	91	0.049	99	100	1.6	0	525	286	630	406	351	440	913	284	75	73	74	70	72	-0.025	6.24	0.16
105	17.072	17.025	0.16	0.16	1.33	83	1.95	1.14	83	1.1	92	0.049	100	100	1.6	0	524	286	624	407	351	438	907	284	75	73	74	70	72	-0.025	6.23	0.17
106	17.234	17.188	0.16	0.16	1.33	83	1.95	1.14	83	1.1	91	0.049	99	100	1.6	0	522	286	619	407	351	437	901	283	75	73	74	70	72	-0.025	6.1	0.18
107	17.398	17.350	0.16	0.16	1.33	83	1.95	1.14	83	1.1	91	0.049	100	99	1.5	-0.1	521	286	613	407	352	436	895	284	74	73	74	70	72	-0.025	6.06	0.2
108	17.561	17.513	0.16	0.16	1.33	83	1.95	1.14	83	1.1	92	0.049	100	100	1.5	0	520	286	608	407	352	435	889	284	74	73	74	70	72	-0.026	5.8	0.22
109	17.725	17.675	0.16	0.16	1.33	83	1.95	1.14	83	1.1	91	0.049	100	99	1.5	0	517	287	603	407	352	433	884	284	74	73	74	70	72	-0.025	5.77	0.25
110	17.888	17.839	0.16	0.16	1.33	83	1.96	1.14	83	1.1	92	0.049	100	101	1.5	0	516	287	598	407	352	432	878	283	74	73	74	70	72	-0.025	5.68	0.26

Wood Heater Test Data - ASTM E2780 / ASTM E2515

Run: 1

Manufacturer: Hearth & Home Intrepid IV Catalytic - KJM 2/12/18
 Model: Intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: 03-Jan-18
 Total Sampling Time: 195 min
 Recording Interval: 1 min
 Beginning Clock Time: 10:43
 Background Sample Volume: _____ cubic feet
 Meter Box Y Factor: 0.981 (1) 0.984 (2) _____ (Amb)

PM Control Modules: 2035_0036
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Dilution Tunnel H₂O: 2.00 percent
 Dilution Tunnel Static: -0.180 "H₂O
 Tunnel Area: 0.19635 ft²
 Pitot Tube Cp: 0.99
 Avg. Tunnel Velocity: 13.15 ft/sec.
 Initial Tunnel Flow: 143.8 scfm
 Average Tunnel Flow: 146.4 scfm
 Post-Test Leak Check (1): 0.000 cfm @ 6 in. Hg
 Post-Test Leak Check (2): 0.000 cfm @ 7 in. Hg
 Average Test Piece Fuel Moisture: 20.21 Dry Basis %

Technician Signature: [Signature]

Barometric Pressure: Begin Middle End Average
30.19 30.16 30.14 30.16 "Hg
 OMNI Equipment Numbers: _____

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center							
Initial dP	0.026	0.046	0.038	0.030	0.030	0.048	0.050	0.030	0.049							
Temp:	96	93	93	93	92	92	92	92	93							
V _{straw}		13.16			ft/sec			V _{scant}		14.95	ft/sec		F _p		0.880	

Elapsed Time (min)	Particulate Sampling Data													Fuel Weight (lb)		Temperature Data (°F)														Stack Gas Data		
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter 1 Temp (°F)	Meter 1 Vacuum ("Hg)	Orifice dH 2 ("H ₂ O)	Meter 2 Temp (°F)	Meter 2 Vacuum ("Hg)	Dilution Tunnel ("F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Avg. Stove Surface	Catalyst Exit	Stack	Filter 1	Dryer Exit 1	Filter 2	Dryer Exit 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
148	24.096	24.025	0.16	0.16	1.33	83	1.95	1.14	84	1.1	90	0.049	100	100	0.9	0	487	285	487	393	349	400	767	266	74	71	74	69	72	-0.022	4.8	0.49
149	24.259	24.187	0.16	0.16	1.33	83	1.95	1.13	84	1.1	90	0.049	100	99	0.8	-0.1	485	284	485	392	348	399	765	266	74	71	74	69	72	-0.021	4.82	0.49
150	24.423	24.350	0.16	0.16	1.33	83	1.95	1.14	84	1.1	90	0.049	100	100	0.8	0	484	284	483	391	348	398	761	265	74	71	74	69	72	-0.022	4.79	0.52
151	24.587	24.513	0.16	0.16	1.33	83	1.96	1.14	84	1.1	90	0.049	100	100	0.8	0	481	284	480	390	347	396	761	264	74	71	74	69	72	-0.021	4.85	0.51
152	24.751	24.676	0.16	0.16	1.33	83	1.96	1.13	84	1.1	90	0.049	100	100	0.8	0	480	284	478	389	347	396	758	263	74	71	74	69	72	-0.021	4.84	0.51
153	24.914	24.839	0.16	0.16	1.32	83	1.96	1.14	84	1.1	90	0.049	100	100	0.8	0	478	284	476	388	346	394	755	263	74	71	74	69	72	-0.021	4.82	0.53
154	25.078	25.001	0.16	0.16	1.32	83	1.96	1.14	84	1.1	89	0.049	100	99	0.8	0	475	284	474	387	346	393	748	262	74	71	74	69	72	-0.020	6.11	0.39
155	25.241	25.164	0.16	0.16	1.33	83	1.95	1.14	84	1.2	89	0.049	99	100	0.8	0	474	284	472	386	345	392	741	261	74	71	74	69	73	-0.020	6.11	0.35
156	25.404	25.327	0.16	0.16	1.33	83	1.96	1.14	84	1.1	89	0.049	99	100	0.7	-0.1	474	283	470	385	344	391	738	260	74	71	74	69	73	-0.019	6.09	0.34
157	25.567	25.491	0.16	0.16	1.33	83	1.95	1.14	84	1.1	89	0.049	99	100	0.7	0	473	283	468	384	344	390	735	260	74	71	74	69	73	-0.020	5.98	0.34
158	25.731	25.653	0.16	0.16	1.34	83	1.95	1.13	84	1.1	89	0.049	100	99	0.7	0	473	283	467	383	343	390	735	258	74	71	74	69	72	-0.020	5.91	0.34
159	25.894	25.816	0.16	0.16	1.33	83	1.95	1.14	84	1.2	89	0.049	99	100	0.7	0	474	283	465	382	343	389	734	257	74	71	74	69	73	-0.020	5.85	0.35
160	26.058	25.978	0.16	0.16	1.33	83	1.96	1.14	84	1.1	89	0.049	100	99	0.7	0	475	283	464	382	342	389	734	258	74	71	74	69	73	-0.020	5.72	0.38
161	26.222	26.141	0.16	0.16	1.33	83	1.96	1.14	84	1.1	89	0.049	100	100	0.6	-0.1	475	283	463	381	342	389	733	259	74	71	74	69	73	-0.020	5.69	0.38
162	26.385	26.305	0.16	0.16	1.33	83	1.96	1.14	84	1.1	89	0.049	99	100	0.6	0	475	283	461	380	341	388	733	258	74	71	74	68	73	-0.020	5.64	0.37
163	26.549	26.468	0.16	0.16	1.33	83	1.95	1.13	84	1.1	89	0.049	100	100	0.6	0	476	283	460	379	340	388	733	256	74	71	74	68	73	-0.020	5.62	0.38
164	26.712	26.630	0.16	0.16	1.32	83	1.95	1.14	84	1.2	89	0.049	99	99	0.6	0	476	283	459	379	340	387	733	258	74	71	74	68	73	-0.019	5.58	0.38
165	26.875	26.793	0.16	0.16	1.33	83	1.95	1.14	84	1.2	89	0.049	99	100	0.6	0	475	282	458	378	340	387	733	258	74	71	74	68	73	-0.020	5.58	0.39
166	27.038	26.956	0.16	0.16	1.33	83	1.95	1.14	84	1.1	89	0.049	99	100	0.6	0	474	282	457	378	339	386	731	257	74	71	74	68	73	-0.019	5.26	0.41
167	27.202	27.119	0.16	0.16	1.33	83	1.96	1.14	84	1.1	89	0.049	100	100	0.5	-0.1	473	282	456	377	339	385	728	256	74	71	74	68	73	-0.020	5.16	0.41
168	27.365	27.281	0.16	0.16	1.33	83	1.96	1.14	84	1.1	89	0.049	99	99	0.5	0	473	282	455	376	338	385	726	256	74	71	74	68	73	-0.019	5.1	0.42
169	27.529	27.444	0.16	0.16	1.33	83	1.95	1.14	84	1.1	89	0.049	100	100	0.5	0	471	282	453	376	337	384	726	256	74	71	74	68	73	-0.020	5.01	0.42
170	27.693	27.607	0.16	0.16	1.32	84	1.96	1.14	84	1.1	89	0.049	100	100	0.5	0	470	282	453	375	337	383	724	257	74	71	74	68	73	-0.019	5	0.43
171	27.856	27.770	0.16	0.16	1.34	84	1.96	1.14	84	1.1	89	0.049	99	100	0.5	0	468	282	451	374	336	382	722	256	74	71	74	68	73	-0.020	4.98	0.45
172	28.020	27.933	0.16	0.16	1.33	84	1.96	1.14	84	1.2	89	0.049	100	100	0.5	0	468	283	450	374	336	382	721	257	74	71	74	68	73	-0.020	4.95	0.46
173	28.183	28.095	0.16	0.16	1.33	83	1.96	1.13	84	1.1	89	0.049	99	99	0.5	0	465	282	449	373	335	381	720	255	74	71	74	68	73	-0.019	4.83	0.48
174	28.346	28.258	0.16	0.16	1.32	84	1.96	1.14	84	1.2	89	0.049	99	100	0.5	0	464	282	447	372	334	380	718	255	74	71	74	68	73	-0.019	4.8	0.47
175	28.509	28.421	0.16	0.16	1.33	84	1.96	1.14	84	1.1	89	0.049	99	100	0.4	-0.1	463	283	446	371	334	379	717	255	74	71	74	68	73	-0.019	4.79	0.48
176	28.673	28.584	0.16	0.16	1.33	84	1.95	1.14	84	1.2	89	0.049	100	100	0.4	0	461	283	445	371	333	379	717	255	74	71	74	68	73	-0.019	4.8	0.49
177	28.836	28.747	0.16	0.16	1.33	84	1.95	1.13	84	1.2	89	0.049	99	100	0.4	0	462	283	444	370	333	378	706	253	74	71	74	68	73	-0.018	6.41	0.33
178	29.000	28.909	0.16	0.16	1.34	84	1.95	1.14	84	1.1	89	0.049	100	99	0.4	0	463	282	443	369	332	378	702	251	74	71	74	68	73	-0.019	6.3	0.32
179	29.164	29.072	0.16	0.16	1.33	84	1.95	1.14	84	1.1	89	0.049	100	100	0.4	0	465	282	442	369	331	378	702	252	74	71	74	68	73	-0.018	6.21	0.33
180	29.327	29.234	0.16	0.16	1.33	84	1.96	1.14	84	1.2	89	0.049	99	99	0.3	-0.1	468	282	441	368	331	378	702	252	74	71	74	68	73	-0.018	6.08	0.34
181	29.490	29.398	0.16	0.16	1.32	84	1.96	1.14	84	1.2	89	0.049	99	100	0.3	0	470	282	441	368	330	378	702	252	74	71	74	68	73	-0.018	6.03	0.35
182	29.653	29.561	0.16	0.16	1.33	84	1.95	1.13	84	1.1	89	0.049	99	100	0.3	0	473	282	440	367	330	378	704	252	75	71	74	68	73	-0.018	5.96	0.36
183	29.817	29.723	0.16	0.16	1.33	84	1.95	1.14	84	1.1	89	0.049	100	99	0.3	0	473	282	439	367	329	378	707	251	75	71	74	68	73	-0.019	6.04	0.38
184	29.980	29.886	0.16	0.16	1.33	84	1.95	1.14	84	1.1	89	0.049	99	100	0.3	0	474	282	438	366	329	378	708	253	75	71	74	68	73	-0.017	5.99	0.39

Wood Heater Test Data - ASTM E2780 / ASTM E2515

Run: 1
 Manufacturer: Hearth & Home Intrepid IV Catalytic - KJM 2/12/18
 Model: Intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: 03-Jan-18
 Total Sampling Time: 195 min
 Recording Interval: 1 min
 Beginning Clock Time: 10:43 Background Sample Volume: _____ cubic feet
 Meter Box Y Factor: 0.981 (1) 0.984 (2) _____ (Amb)
 Barometric Pressure: Begin Middle End Average
30.19 30.16 30.14 30.16 "Hg
 OMNI Equipment Numbers: _____

PM Control Modules: 2035_0036
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Dilution Tunnel H2O: 2.00 percent
 Dilution Tunnel Static: -0.180 "H2O
 Tunnel Area: 0.18635 ft²
 Pitot Tube Cp: 0.98
 Avg. Tunnel Velocity: 13.15 ft/sec.
 Initial Tunnel Flow: 143.8 scfm
 Average Tunnel Flow: 146.4 scfm
 Post-Test Leak Check (1): 0.000 cfm @ 6 in. Hg
 Post-Test Leak Check (2): 0.000 cfm @ 7 in. Hg
 Average Test Piece Fuel Moisture: 20.21 Dry Basis %

Technician Signature: *[Signature]*

Velocity Traverse Data										
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center	
Initial dP	0.026	0.046	0.038	0.030	0.030	0.048	0.050	0.030	0.049	"H2O
Temp:	96	93	93	93	92	92	92	92	93	"F
	V _{straw} <u>13.16</u> ft/sec			V _{scant} <u>14.95</u> ft/sec			F _p <u>0.880</u>			

Elapsed Time (min)	Particulate Sampling Data													Fuel Weight (lb)		Temperature Data (°F)													Stack Gas Data			
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter 1 Temp (°F)	Meter 1 Vacuum ("Hg)	Orifice dH 2 ("H ₂ O)	Meter 2 Temp (°F)	Meter 2 Vacuum ("Hg)	Dilution Tunnel Temp (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Avg. Stove Surface	Catalyst Exit	Stack	Filter 1	Dryer Exit 1	Filter 2	Dryer Exit 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
185	30.143	30.049	0.16	0.16	1.33	84	1.95	1.14	84	1.2	89	0.049	99	100	0.2	-0.1	473	282	438	366	328	377	709	253	75	71	74	68	73	-0.018	5.99	0.4
186	30.307	30.212	0.16	0.16	1.34	84	1.96	1.14	84	1.1	88	0.049	100	100	0.2	0	474	282	437	366	328	377	711	251	75	71	74	68	73	-0.018	5.88	0.4
187	30.471	30.374	0.16	0.16	1.32	84	1.96	1.13	84	1.1	88	0.049	100	99	0.2	0	474	282	437	366	328	377	712	251	75	71	74	68	73	-0.019	5.9	0.42
188	30.634	30.537	0.16	0.16	1.32	84	1.96	1.14	84	1.1	88	0.049	99	100	0.2	0	474	282	436	366	328	377	707	251	74	71	74	68	73	-0.019	5.85	0.39
189	30.798	30.699	0.16	0.16	1.33	84	1.95	1.14	84	1.1	87	0.049	100	99	0.2	0	473	282	436	366	328	377	706	250	75	71	74	68	73	-0.019	5.81	0.38
190	30.961	30.863	0.16	0.16	1.32	84	1.96	1.14	84	1.2	87	0.049	99	100	0.1	-0.1	473	282	435	366	327	377	705	251	74	71	74	68	73	-0.019	5.83	0.38
191	31.124	31.025	0.16	0.16	1.33	84	1.95	1.14	84	1.1	87	0.049	99	99	0.1	0	474	282	435	366	327	377	703	251	74	71	74	68	73	-0.018	5.81	0.38
192	31.287	31.188	0.16	0.16	1.33	84	1.95	1.13	84	1.1	87	0.049	99	99	0.1	0	472	282	434	365	327	376	703	251	74	71	74	68	73	-0.018	5.7	0.38
193	31.450	31.350	0.16	0.16	1.34	84	1.96	1.14	84	1.1	87	0.049	99	99	0.0	-0.1	472	282	434	365	327	376	701	252	74	71	74	68	73	-0.019	5.88	0.37
194	31.614	31.513	0.16	0.16	1.33	84	1.95	1.14	84	1.2	87	0.049	100	99	0.0	0	472	282	433	365	327	376	700	251	74	71	74	68	73	-0.019	5.8	0.36
195	31.778	31.677	0.16	0.16	1.33	84	1.95	1.14	84	1.2	87	0.049	100	100	0.0	0	472	282	432	364	327	375	698	251	74	71	74	68	73	-0.018	5.79	0.36
Avg/Tot	31.778	31.677	0.16	0.16	1.32	81	1.95	1.14	82	1.2	87	0.049	100	100	0.0	0	472	282	432	364	327	375	703	251	74	71	74	69	72	-0.027		

Wood Heater Lab Data - ASTM E2780 / ASTM E2515

Intrepid IV Catalytic - KJM 2/12/18

Manufacturer: Hearth & Home Equipment Numbers: _____
 Model: Intrepid IV Catalytic _____
 Tracking No.: 2264 _____
 Project No.: 0135WS038E _____
 Run #: 1 _____
 Date: 1/3/18 _____

TRAIN 1 (First Hour emissions)

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
B. Front filter catch	Filter	D331	111.9	111.4	0.5
C. Rear filter catch	Filter				0.0
D. Probe catch*	Probe				0.0
E. Filter seals catch*	Seals				0.0

Sub-Total Total Particulate, mg: **0.5**

TRAIN 1 (Post First Hour Change-out)

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
B. Front filter catch	Filter	D332	110.9	110.7	0.2
C. Rear filter catch	Filter	D333	110.9	111.8	-0.9
D. Probe catch*	Probe	6	115349.8	115348.8	1.0
E. Filter seals catch*	Seals	R551	4130.6	4129.1	1.5

Sub-Total Total Particulate, mg: **1.8**

Train 1 Aggregate Total Particulate, mg: **2.3**

TRAIN 2

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	D334	112.2	111.9	0.3
B. Rear filter catch	Filter	D335	111.5	111.7	-0.2
C. Probe catch*	Probe	11	114187.5	114187.0	0.5
D. Filter seals catch*	Seals	R552	4173.9	4173.2	0.7

Total Particulate, mg: 1.3

AMBIENT

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch*	Filter		0.0	0.0	0.0

Total Particulate, mg: 0.0

*Particulate catch that results in a negative number, is assumed to be zero for probes and seals, negative numbers for filters are assumed to be part of the seal weight.

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Technician Signature:

Wood Heater Test Results - ASTM E2780 / ASTM E2515

Manufacturer: Hearth & Home Intrepid IV Catalytic - KJM 2/12/18
 Model: Intrepid IV-Catalytic
 Project No.: 0135WS038E
 Tracking No.: 2264
 Run: 1
 Test Date: 01/03/18

Burn Rate	1.00 kg/hr dry
Average Tunnel Temperature	92 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	13.15 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8786.4 dscf/hour
Average Delta p	0.049 inches H2O
Total Time of Test	195 minutes

	AMBIENT	SAMPLE TRAIN 1	SAMPLE TRAIN 2	FIRST HOUR FILTER (TRAIN 1)
Total Sample Volume - Vm	0.000 cubic feet	31.778 cubic feet	31.677 cubic feet	9.714 cubic feet
Average Gas Meter Temperature	72 degrees Fahrenheit	81 degrees Fahrenheit	82 degrees Fahrenheit	78 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	0.000 dscf	30.744 dscf	30.704 dscf	9.462 dscf
Total Particulates - m _T	0 mg	2.3 mg	1.3 mg	0.5 mg
Particulate Concentration (dry-standard) - C _p /C _s	0.000000 grams/dscf	0.000007 grams/dscf	0.000004 grams/dscf	0.000005 grams/dscf
Total Particulate Emissions - E _T	0.00 grams	2.14 grams	1.21 grams	0.46 grams
Particulate Emission Rate	0.00 grams/hour	0.66 grams/hour	0.37 grams/hour	0.46 grams/hour
Emissions Factor		0.65 g/kg	0.37 g/kg	0.25 g/kg
Difference from Average Total Particulate Emissions		0.46 grams	0.46 grams	

Dual Train Comparison Results Are Acceptable

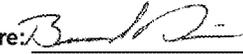
FINAL AVERAGE RESULTS	
Complete Test Run	
Total Particulate Emissions - E _T	1.67 grams
Particulate Emission Rate	0.51 grams/hour
Emissions Factor	0.51 grams/kg
First Hour Emissions	
Total Particulate Emissions - E _T	0.46 grams
Particulate Emission Rate	0.46 grams/hour
Emissions Factor	0.25 grams/kg
7.5% of Average Total Particulate Emissions	0.13 grams

QUALITY CHECKS	
Filter Temps < 90 °F	OK
Filter Face Velocity (47 mm)	OK
Dryer Exit Temp < 80F	OK
Leakage Rate	OK
Ambient Temp (55-90°F)	OK
Negative Probe Weight Eval.	OK
Pro-Rate Variation	OK
Stove Surface ΔT	OK

Technician Signature: 

Wood Heater Efficiency Results - CSA B415.1

Manufacturer: Hearth & Home
Model: repiod IV Catalytic
Date: 01/03/18
Run: 1
Control #: 0135WS038E
Test Duration: 195
Output Category: II

Technician Signature: 

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	78.4%	84.7%
Combustion Efficiency	98.1%	98.1%
Heat Transfer Efficiency	80%	86.4%

Output Rate (kJ/h)	15,332	14,544	(Btu/h)
Burn Rate (kg/h)	0.99	2.18	(lb/h)
Input (kJ/h)	19,556	18,551	(Btu/h)

Test Load Weight (dry kg)	3.21	7.07	dry lb
MC wet (%)	16.80993844		
MC dry (%)	20.21		
Particulate (g)	0.51		
CO (g)	97		
Test Duration (h)	3.25		

Emissions	Particulate	CO
g/MJ Output	0.01	1.95
g/kg Dry Fuel	0.16	30.36
g/h	0.16	29.97
lb/MM Btu Output	0.02	4.54

Air/Fuel Ratio (A/F)	13.31
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VERSION: 2.2 12/14/2009

Client: Hearth & Home Project Number: 0135WS038E Run Number: 2

Model: Intrepid IV Catalytic Tracking Number: 2264 Date: 1/3/18

Test Crew: B Davis

OMNI Equipment ID numbers: _____

ASTM E2515 Lab Sheet

Assembled By:

1/3/18 1610 B Davis

Date/Time in Dessicator:

1/3/18 1610

Weighing #1	Weighing #2	Weighing #3	Weighing #4	Weighing #5
Date/Time: <u>1/4/18 0830</u>	Date/Time: <u>1/9/18 0830</u>	Date/Time: <u>1/10/18 0830</u>	Date/Time:	Date/Time:
R/H %: <u>5.2</u>	R/H %: <u>8.9</u>	R/H %: <u>6.7</u>	R/H %:	R/H %:
Temp: <u>72.4</u>	Temp: <u>71.2</u>	Temp: <u>68.9</u>	Temp:	Temp:
200 mg Audit: <u>0.2000</u>	200 mg Audit: <u>0.2000</u>	200 mg Audit:	200 mg Audit:	200 mg Audit:
2 g Audit: <u>1.9998</u>	2 g Audit: <u>2.0000</u>	2 g Audit:	2 g Audit:	2 g Audit:
100 g Audit: <u>99.9978</u>	100 g Audit: <u>99.9978</u>	100 g Audit:	100 g Audit:	100 g Audit:
Initials: <u>BD</u>	Initials: <u>BD</u>	Initials:	Initials:	Initials:

Train	Element	ID #	Tare (mg)	Weight (mg)				
A (First Hour)	Front Filter	D331	111.4	112.0	111.9	✓		
	Rear Filter							
	Probe							
	O-Ring Set							
A (Remainder)	Front Filter	D332	110.7	110.9	110.9	✓		
	Rear Filter	D333	111.8	110.8	110.9	✓		
	Probe	6	115348.8	115349.6	115349.8	✓		
	O-Ring Set	R551	4129.1	4130.6	4130.6	✓		
B	Front Filter	D334	111.9	112.2	112.2	✓		
	Rear Filter	D335	111.7	111.5	111.5	✓		
	Probe	11	114187.0	114187.6	114187.5	✓		
	O-Ring Set	R552	4173.2	4173.8	4173.9	✓		
BG	Filter							

Technician Signature: B Davis

Date: 1/23/18

ASTM E2780 Wood Heater Run Sheets

Client: Hearth & Home Project Number: 0135WS038E Run Number: 1

Model: Intrepid IV Catalytic Tracking Number: 2264 Date: 1/3/18

Test Crew: B. Davis

OMNI Equipment ID numbers: _____

Wood Heater Supplemental Data

Start Time: 11:43 Booth #: E1

Stop Time: 14:57

Stack Gas Leak Check:

Initial: good Final: good

Sample Train Leak Check:

A: 0.0 @ 6 "Hg
B: 0.0 @ 7 "Hg

Calibrations: Span Gas CO₂: 16.74 CO: 4.20/901

	Pre Test		Post Test	
	Zero	Span	Zero	Span
Time	<u>11:26</u>	<u>11:26</u>	<u>1511</u>	<u>1511</u>
CO ₂	<u>0.00</u>	<u>16.74</u>	<u>0.00</u>	<u>16.69</u>
CO	<u>0.000/0</u>	<u>4.201/898</u>	<u>0.000/-1</u>	<u>4.19/890</u>

Air Velocity (ft/min): Initial: <50 Final: <50

Scale Audit (lbs): Initial: 10.0 Final: 10.0

Pitot Tube Leak Test: Initial: good Final: good

Stack Diameter (in): 6"

Induced Draft: 0.0

% Smoke Capture: 100%

Flue Pipe Cleaned Prior to First Test in Series:

Date: 1/3/18 Initials: BA

	Initial	Middle	Ending
P _o (in/Hg)	<u>30.19</u>	<u>30.16</u>	<u>30.14</u>
RH (%)	<u>14.4</u>	<u>13.9</u>	<u>17.1</u>
Ambient (°F)	<u>72</u>	<u>72</u>	<u>73</u>

Tunnel Traverse		
Microtector Reading	dP (in H ₂ O)	T(°F)
1	<u>.026</u>	<u>96</u>
2	<u>.046</u>	<u>93</u>
3	<u>.038</u>	<u>93</u>
4	<u>.030</u>	<u>93</u>
1	<u>.030</u>	<u>92</u>
2	<u>.042</u>	<u>92</u>
3	<u>.050</u>	<u>92</u>
4	<u>.030</u>	<u>92</u>
Center:		
	<u>.048/050</u>	<u>93</u>

Background Filter Volume: NA

Tunnel Static Pressure (in H ₂ O):	
Beginning of Test	End of Test
<u>-.18</u>	<u>-.18</u>

Technician Signature: [Signature]

Date: 1/23/18 34

ASTM E2780 Wood Heater Run Sheets

Client: Hearth & Home Project Number: 0135WS038E Run Number: 1

Model: Intrepid IV Catalytic Tracking Number: 2264 Date: 1/3/18

Test Crew: D Davis

OMNI Equipment ID numbers: 431, 340

Wood Heater Fuel Data

Fuel: Douglas fir, untreated and air dried, standard grade or better dimensional lumber

Pre-Burn Fuel					
Calibration:	Cal Value (1) = 12%	Actual Reading	<u>12</u>		
	Cal Value (2) = 22%	Actual Reading	<u>22</u>		
Piece:	Length:	Reading:	Piece:	Length:	Reading:
1	<u>36</u> in	<u>23.5</u>	7	_____ in	_____
2	<u>36</u> in	<u>19.1</u>	8	_____ in	_____
	<u>36</u> ft	<u>20.8</u>			
3	<u>36</u> in	<u>23.7</u>	9	_____ in	_____
4	_____ in	_____	10	_____ in	_____
5	_____ in	_____	11	_____ in	_____
6	_____ in	_____	12	_____ in	_____
Total Pre-Burn Fuel Weight: <u>13.7</u>			Pre-Burn Fuel Average Moisture: <u>21.70</u>		
Time (clock): <u>0825</u>		Room Temperature (F): <u>70</u>		Initials: <u>BD</u>	

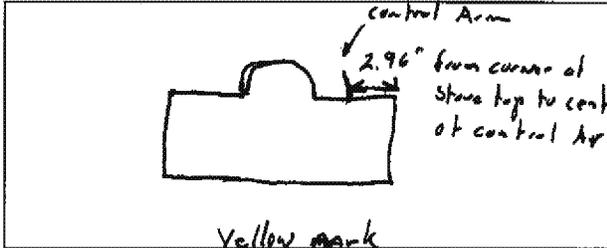
Test Fuel					
Firebox Volume (ft ³):	<u>1.31</u>	Test Fuel Piece Length (in):	<u>13.5</u>		
Load Weight Range (lb):	<u>8.25 - 9.17 - 10.08</u>	Total Wet Fuel Load Weight (lb):	<u>8.5</u>		
Fuel Type & Amount:	2 x 4: <u>5</u>	4 x 4:	<u>0</u>		
Weight (with spacers):	<u>8.5</u>	Weight (with spacers):	<u>0</u>		
Piece:	Weight (lbs):	Moisture Readings (%DB):		Fuel Type:	
1	<u>1.3</u>	<u>21.3</u>	<u>20.6</u>	<u>19.7</u>	<u>2x4</u>
2	<u>1.3</u>	<u>22.5</u>	<u>21.3</u>	<u>20.0</u>	<u>2x4</u>
3	<u>1.2</u>	<u>19.9</u>	<u>19.7</u>	<u>19.0</u>	<u>2x4</u>
4	<u>1.2</u>	<u>18.9</u>	<u>19.3</u>	<u>19.2</u>	<u>2x4</u>
5	<u>1.4</u>	<u>20.8</u>	<u>19.5</u>	<u>21.4</u>	<u>2x4</u>
6	_____	_____	_____	_____	_____
7	_____	_____	_____	_____	_____
Spacer Moisture Readings (%DB)					
<u>10.0</u>	<u>14.9</u>	<u>14.9</u>	<u>11.2</u>	<u>8.0</u>	_____
<u>10.5</u>	<u>14.8</u>	<u>15.2</u>	<u>8.0</u>	<u>7.8</u>	_____
<u>11.3</u>	<u>10.8</u>	<u>13.0</u>	<u>15.2</u>	_____	_____
<u>11.4</u>	<u>7.5</u>	<u>14.8</u>	<u>15.6</u>	_____	_____
Technician Signature: <u>10:05</u>		Room Temperature (F): <u>70</u>		Date: <u>1/3/18</u>	
<u>BD</u>				<u>1/23/18</u>	

Wood Heater Run Notes

Air Control Settings

Primary: _____

Secondary: fixed



Tertiary/Pilot: N/A

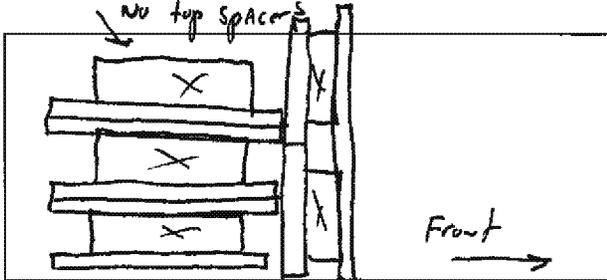
Fan: N/A

Preburn Notes

Time	Notes
10	Raked coals
30	Raked coals
50	Raked coals
70	Raked coals
90	Raked coals
96	Leveled coal bed

Test Notes

Sketch test fuel configuration:



Start up procedures & Timeline:

Bypass: closed by 1:00 min

Fuel loaded by: by 55 seconds

Door closed at: 1:00 min

Primary air: At test setting entire test.

Notes: N/A

Time	Notes
60	changed front filter in train A.

*Model: Intrepid FlexBurn Catalytic
Hearth and Home Technologies
352 Mountain House Road
Halifax, PA 17032*

Run 2

Wood Heater Preburn Data - ASTM E2780

Run: 2

Intrepid IV Catalytic - KJM 2/12/18

Technician Signature: 

Manufacturer: Hearth & Home
 Model: Intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: 1/4/18
 Beginning Clock Time: 9:48

Preburn Fuel Data	
Fuel Piece Lengths (in.):	6
Total Preburn Weight (lb):	13.4
	23.8
Fuel Moisture Readings (% DB):	22.2
	22.3
	22.2
Avg Preburn Moisture (% DB):	22.63

Coal Bed Range (lb):	1.7 (min)	2.1 (max)
----------------------	--------------	--------------

Elapsed Time (min)	Scale (lb)	Stack Draft (in H ₂ O)	Temperatures (°F)							
			FB Top	FB Bottom	FB Back	FB Left	FB Right	Avg. FB	Stack	Ambient
0	10	-0.071	312	147	375	202	198	246.8	766	70
1	9.9	-0.061	325	152	401	204	206	257.6	537	70
2	9.8	-0.053	330	156	422	206	213	265.4	438	70
3	9.8	-0.049	332	161	439	208	220	272	383	71
4	9.7	-0.045	332	165	451	211	227	277.2	350	70
5	9.6	-0.044	331	170	460	213	233	281.4	330	70
6	9.6	-0.041	330	174	466	216	238	284.8	314	70
7	9.5	-0.04	329	178	470	217	243	287.4	302	70
8	9.5	-0.038	327	183	472	219	247	289.6	293	71
9	9.4	-0.036	326	187	474	221	251	291.8	286	71
10	9.4	-0.035	324	191	474	223	254	293.2	282	71
11	9.3	-0.032	319	195	472	224	256	293.2	289	71
12	9.3	-0.033	318	198	471	226	258	294.2	277	70
13	9.2	-0.033	317	202	472	227	260	295.6	272	70
14	9.2	-0.033	317	206	472	228	262	297	270	70
15	9.1	-0.032	316	209	473	228	263	297.8	269	70
16	9	-0.033	315	212	475	230	264	299.2	268	71
17	9	-0.032	313	215	475	230	265	299.6	268	70
18	8.9	-0.032	312	218	476	231	265	300.4	269	71
19	8.8	-0.03	312	221	477	231	266	301.4	268	71
20	8.8	-0.031	311	224	477	231	267	302	266	70
21	8.7	-0.03	311	226	477	232	267	302.6	264	70
22	8.7	-0.029	310	228	477	232	268	303	263	70
23	10.6	-0.085	308	231	477	232	268	303.2	371	71
24	8.5	-0.031	314	233	477	232	271	305.4	308	70
25	8.4	-0.03	315	235	478	232	272	306.4	283	71
26	8.4	-0.03	315	237	479	232	273	307.2	273	71
27	8.3	-0.03	314	239	480	232	274	307.8	268	71
28	8.3	-0.028	314	241	481	233	275	308.8	264	70
29	8.2	-0.028	313	243	481	232	276	309	262	70
30	8.2	-0.027	313	245	482	232	277	309.8	260	70
31	8.6	-0.058	316	246	479	232	278	310.2	279	70
32	7.9	-0.037	318	248	476	232	279	310.6	484	71
33	7.8	-0.035	318	250	482	232	279	312.2	347	71
34	7.7	-0.033	316	252	492	232	280	314.4	307	71
35	7.6	-0.033	314	253	504	232	281	316.8	292	71
36	7.5	-0.032	312	254	515	232	281	318.8	286	71
37	7.5	-0.031	311	256	529	232	282	322	281	71
38	7.4	-0.032	309	257	542	232	282	324.4	280	71

Wood Heater Preburn Data - ASTM E2780

Intrepid IV Catalytic - KJM 2/12/18

Run: 2

Technician Signature: *[Signature]*

Manufacturer: Hearth & Home
 Model: Intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: 1/4/18
 Beginning Clock Time: 9:48

Preburn Fuel Data	
Fuel Piece Lengths (in.):	6
Total Preburn Weight (lb):	13.4
Fuel Moisture Readings (% DB):	23.8
	22.2
	22.3
	22.2
Avg Preburn Moisture (% DB):	22.63

Coal Bed Range (lb):	1.7 (min)	2.1 (max)
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Elapsed Time (min)	Scale (lb)	Stack Draft (in H ₂ O)	Temperatures (°F)							Stack	Ambient
			FB Top	FB Bottom	FB Back	FB Left	FB Right	Avg. FB			
39	7.3	-0.032	309	258	556	232	283	327.6	281	71	
40	7.2	-0.032	308	259	572	232	283	330.8	283	71	
41	7.1	-0.033	308	260	587	232	284	334.2	284	71	
42	7	-0.033	309	261	601	232	284	337.4	285	71	
43	6.9	-0.033	309	262	616	233	284	340.8	286	71	
44	6.9	-0.033	310	263	629	233	284	343.8	287	71	
45	6.8	-0.033	312	264	642	233	284	347	288	71	
46	6.7	-0.033	313	265	652	234	284	349.6	288	71	
47	6.6	-0.032	315	266	662	234	285	352.4	289	71	
48	6.6	-0.032	317	267	671	235	285	355	289	71	
49	6.5	-0.033	320	268	679	235	285	357.4	290	71	
50	6.4	-0.032	322	270	687	236	286	360.2	289	71	
51	6.2	-0.045	328	271	692	237	286	362.8	589	71	
52	6.1	-0.041	337	272	701	238	287	367	404	71	
53	6	-0.039	343	273	709	239	288	370.4	351	71	
54	5.9	-0.037	348	275	717	241	290	374.2	330	71	
55	5.8	-0.038	353	276	724	242	291	377.2	319	71	
56	5.7	-0.036	357	277	730	244	292	380	315	71	
57	5.6	-0.036	361	278	735	245	294	382.6	312	71	
58	5.5	-0.036	365	279	739	247	296	385.2	310	71	
59	5.5	-0.036	368	280	743	248	298	387.4	308	71	
60	5.4	-0.035	371	281	746	250	300	389.6	307	71	
61	5.3	-0.035	374	282	748	251	302	391.4	306	71	
62	5.2	-0.035	377	283	750	253	305	393.6	305	71	
63	5.2	-0.034	379	284	752	255	308	395.6	303	71	
64	5.1	-0.034	381	284	753	256	311	397	302	71	
65	5	-0.034	382	285	754	258	314	398.6	302	71	
66	5	-0.034	384	286	754	259	317	400	301	71	
67	4.9	-0.034	386	287	753	261	319	401.2	300	71	
68	4.8	-0.033	387	287	752	262	321	401.8	299	71	
69	4.8	-0.034	389	288	750	264	323	402.8	297	71	
70	4.7	-0.032	390	289	748	265	326	403.6	296	71	
71	4.6	-0.033	392	290	746	266	328	404.4	296	71	
72	4.6	-0.033	393	291	744	268	330	405.2	297	71	
73	4.5	-0.033	394	292	741	269	332	405.6	296	71	
74	4.5	-0.032	396	293	739	270	335	406.6	296	71	
75	4.4	-0.032	398	294	737	271	337	407.4	295	71	
76	4.3	-0.032	399	294	735	273	339	408	296	71	
77	4.3	-0.033	402	295	732	274	342	409	294	71	

Wood Heater Preburn Data - ASTM E2780

Run: 2

Intrepid IV Catalytic - KJM 2/12/18

Technician Signature: *B. [Signature]*

Manufacturer: Hearth & Home
 Model: Intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: 1/4/18
 Beginning Clock Time: 9:48

Preburn Fuel Data	
Fuel Piece Lengths (in.):	6
Total Preburn Weight (lb):	13.4
Fuel Moisture Readings (% DB):	23.8
	22.2
	22.3
	22.2
Avg Preburn Moisture (% DB):	22.63

Coal Bed Range (lb):	1.7 (min)	2.1 (max)
----------------------	--------------	--------------

Elapsed Time (min)	Scale (lb)	Stack Draft (in H ₂ O)	Temperatures (°F)							
			FB Top	FB Bottom	FB Back	FB Left	FB Right	Avg. FB	Stack	Ambient
78	4.2	-0.032	404	296	730	275	344	409.8	293	71
79	4.2	-0.031	407	297	729	276	346	411	293	71
80	4.1	-0.032	409	298	727	278	348	412	293	71
81	3.9	-0.043	416	299	724	278	351	413.6	577	71
82	3.8	-0.04	426	300	726	280	354	417.2	396	71
83	3.7	-0.038	437	301	729	281	356	420.8	347	72
84	3.7	-0.036	446	302	734	283	359	424.8	328	72
85	3.6	-0.036	454	303	739	285	362	428.6	320	71
86	3.5	-0.034	461	304	742	287	365	431.8	314	72
87	3.5	-0.034	468	305	745	289	369	435.2	309	72
88	3.4	-0.033	475	306	746	291	372	438	305	72
89	3.4	-0.033	480	306	746	293	374	439.8	303	72
90	3.3	-0.032	483	307	744	295	376	441	301	71
91	3.3	-0.033	488	307	742	296	379	442.4	298	72
92	3.2	-0.031	490	308	739	298	380	443	296	72
93	3.2	-0.03	492	309	735	300	382	443.6	293	72
94	3.1	-0.03	491	309	730	302	383	443	293	72
95	3.1	-0.031	491	310	725	304	384	442.8	290	72
96	3.1	-0.029	490	310	720	305	386	442.2	288	72
97	3	-0.03	489	311	714	307	387	441.6	286	72
98	3	-0.028	488	311	708	309	388	440.8	284	72
99	3	-0.028	487	312	702	310	389	440	282	72
100	2.9	-0.029	486	313	696	312	389	439.2	282	72
101	2.9	-0.028	485	313	691	313	390	438.4	280	72
102	2.9	-0.029	485	314	685	314	390	437.6	280	72
103	2.8	-0.028	486	315	679	316	391	437.4	279	72
104	2.8	-0.028	487	315	673	317	392	436.8	278	72
105	3.2	-0.105	489	316	665	319	392	436.2	378	72
106	4.4	-0.029	495	316	659	320	392	436.4	374	72
107	2.3	-0.033	505	317	656	321	392	438.2	362	72
108	2.3	-0.031	504	319	655	322	392	438.4	313	72
109	2.2	-0.028	499	319	655	324	392	437.8	293	72
110	2.2	-0.027	495	320	654	325	393	437.4	282	72
111	2.2	-0.027	490	321	652	327	393	436.6	276	72
112	2.2	-0.027	485	321	650	328	393	435.4	273	72
113	2.2	-0.026	481	321	647	329	394	434.4	269	72
114	2.1	-0.025	479	322	643	330	394	433.6	265	72
115	2.1	-0.026	476	321	639	330	395	432.2	262	72
116	2.1	-0.025	473	322	635	331	395	431.2	261	72

Wood Heater Preburn Data - ASTM E2780

Intrepid IV Catalytic - KJM 2/12/18

Run: 2

Technician Signature: B. [Signature]

Manufacturer: Hearth & Home
 Model: Intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: 1/4/18
 Beginning Clock Time: 9:48

Preburn Fuel Data	
Fuel Piece Lengths (in.):	6
Total Preburn Weight (lb):	13.4
	23.8
Fuel Moisture Readings (% DB):	22.2
	22.3
	22.2
Avg Preburn Moisture (% DB):	22.63

Coal Bed	1.7	2.1
Range (lb):	(min)	(max)

Elapsed Time (min)	Scale (lb)	Stack Draft (in H ₂ O)	Temperatures (°F)							
			FB Top	FB Bottom	FB Back	FB Left	FB Right	Avg. FB	Stack	Ambient
117	2.1	-0.024	471	322	630	332	396	430.2	260	72
118	2.1	-0.023	470	322	625	333	396	429.2	258	72
119	2.1	-0.024	468	322	620	333	396	427.8	256	72
120	2.1	-0.023	466	322	615	333	397	426.6	255	72
121	2	-0.023	465	323	610	334	397	425.8	255	72
122	2	-0.023	464	323	605	334	397	424.6	254	72
123	2	-0.022	464	323	601	334	398	424	253	72

Wood Heater Test Fuel Data - ASTM E2780

Manufacturer: Hearth & Home
Model: Intrepid IV Catalytic Intrepid IV Catalytic - KJM 2/12/18
Tracking No.: 2264
Project No.: 0135WS038E
Test Date: 1/4/2018
Run No.: 2

Firebox Volume (ft ³):	1.31
Fuel Piece Length (in):	13.5
2x4 Crib Weight (lb):	8.5
4x4 Crib Weight (lb):	0

Total Fuel Weight (Dry Basis, lb):	7.1	
Fuel Density (lb/ft ³ , Dry Basis):	25.56	OK
Loading Density (lb/ft ³ , Wet Basis):	6.49	OK
2x4 Percentage:	N/A	N/A

Coal Bed Range (20-25%): **1.7 - 2.125**

Test Fuel Piece	Weight (lb)	Size	Readings (Dry Basis %)			Dry Weight (lb)
1	1.4	2"x 4"	19.4	22.4	20.1	1.16
2	1.3	2"x 4"	19.2	20.1	18.7	1.09
3	1.2	2"x 4"	20.2	20.2	18.6	1.00
4	1.1	2"x 4"	21.6	19.1	18.9	0.92
5	1.3	2"x 4"	23.1	18.9	22.2	1.07

Spacer Readings (Dry Basis %)			
6.7	18.3		
8.0	20.6		
8.0	14.8		
11.4	20.5		
21.3	18.2		
19.3	19.2		
19.2	15.1		
13.9			
20.3			
18.3			
18.5			
14.1			
22.0			

Technician Signature:

Wood Heater Test Data - ASTM E2780 / ASTM E2515

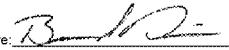
Run: 2

Manufacturer: Hearth & Home
 Model: Intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: 04-Jan-18
 Beginning Clock Time: 11:53

Intrepid IV Catalytic - KJM 2/12/18
 Total Sampling Time: 266 min
 Recording Interval: 1 min
 Background Sample Volume: _____ cubic feet
 Meter Box Y Factor: 0.981 (1) 0.984 (2) _____ (Amb)
 Barometric Pressure: Begin Middle End Average
30.10 30.06 30.08 30.08 "Hg
 OMNI Equipment Numbers: _____

PM Control Modules: 2035, 0036
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Dilution Tunnel H2O: 2.00 percent
 Dilution Tunnel Static: -0.180 "H2O
 Tunnel Area: 0.19635 ft2
 Pitot Tube Cp: 0.98

Avg. Tunnel Velocity: 13.21 ft/sec.
 Initial Tunnel Flow: 145.5 scfm
 Average Tunnel Flow: 148.4 scfm
 Post-Test Leak Check (1): 0.000 cfm @ 7 in. Hg
 Post-Test Leak Check (2): 0.000 cfm @ 5 in. Hg
 Average Test Piece Fuel Moisture: 20.18 Dry Basis %

Technician Signature: 

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center			
Initial dP	0.026	0.046	0.048	0.034	0.026	0.042	0.044	0.034	0.050	"H2O		
Temp:	88	88	88	88	88	88	88	88	88	*F		
V_{straw}	13.24				V_{scant}				15.06	ft/sec	F_p	0.879

Elapsed Time (min)	Particulate Sampling Data												Fuel Weight (lb)		Temperature Data (°F)														Stack Gas Data			
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter 1 Temp (°F)	Meter 1 Vacuum ("Hg)	Orifice dH 2 ("H ₂ O)	Meter 2 Temp (°F)	Meter 2 Vacuum ("Hg)	Dilution Tunnel Temp (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Avg. Stove Surface	Catalyst Exit	Stack	Filter 1	Dryer Exit 1	Filter 2	Dryer Exit 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
0	0.000	0.000			0.95	75	1.76	0.89	75	1.1	104	0.050			8.5		459	323	591	334	398	421	930	263	70	67	71	66	72	-0.022	1.92	0.16
1	0.156	0.156	0.16	0.16	1.34	75	1.98	1.14	75	1.1	125	0.050	99	100	8.5	0	452	323	583	334	399	418	916	254	72	72	72	68	72	-0.043	1	0.17
2	0.318	0.317	0.16	0.16	1.34	75	1.98	1.14	75	1.1	104	0.050	101	101	8.4	-0.1	431	323	579	333	399	413	1041	247	72	73	72	68	72	-0.023	7.69	0.26
3	0.482	0.481	0.16	0.16	1.34	75	1.98	1.13	75	1.1	94	0.050	101	102	8.4	0	417	324	578	332	398	410	1065	242	72	73	72	68	72	-0.025	8.36	0.02
4	0.645	0.644	0.16	0.16	1.34	75	1.98	1.15	75	1.1	92	0.050	101	101	8.3	-0.1	403	324	580	331	397	407	1088	242	72	73	72	69	72	-0.025	8.47	0.01
5	0.807	0.807	0.16	0.16	1.33	75	1.98	1.15	75	1.2	90	0.050	100	101	8.3	0	392	323	583	330	396	405	1105	244	72	73	72	69	72	-0.026	8.41	0.01
6	0.970	0.969	0.16	0.16	1.33	75	1.97	1.16	75	1.2	89	0.050	100	100	8.2	-0.1	383	323	587	328	394	403	1095	246	72	73	72	69	72	-0.026	7.61	0.01
7	1.132	1.133	0.16	0.16	1.33	75	1.98	1.15	75	1.2	89	0.050	100	102	8.2	0	375	324	591	327	392	402	1084	249	72	73	72	69	72	-0.026	7.46	0.02
8	1.294	1.297	0.16	0.16	1.33	75	1.97	1.15	75	1.1	88	0.050	100	101	8.1	-0.1	367	323	596	325	389	400	1094	252	72	73	72	69	72	-0.026	7.99	0.01
9	1.457	1.459	0.16	0.16	1.32	75	1.97	1.14	76	1.1	88	0.050	100	100	8.1	0	361	323	600	323	387	399	1099	253	72	73	72	69	72	-0.027	7.98	0.01
10	1.620	1.622	0.16	0.16	1.33	75	1.96	1.15	76	1.2	88	0.050	100	101	8.0	-0.1	356	322	604	321	384	397	1116	255	72	73	73	69	72	-0.028	8.44	0.01
11	1.782	1.785	0.16	0.16	1.32	75	1.96	1.15	76	1.1	88	0.050	100	101	7.9	-0.1	353	322	608	319	381	397	1136	258	72	73	73	69	72	-0.028	9.05	0.01
12	1.944	1.948	0.16	0.16	1.32	76	1.97	1.14	76	1.1	88	0.050	99	101	7.9	0	349	322	612	317	378	396	1139	259	73	73	73	69	72	-0.029	8.75	0.01
13	2.105	2.111	0.16	0.16	1.32	76	1.96	1.14	76	1.1	88	0.050	99	101	7.8	-0.1	347	321	616	315	375	395	1144	262	73	73	73	69	72	-0.029	8.73	0.01
14	2.267	2.274	0.16	0.16	1.32	76	1.96	1.14	76	1.1	89	0.050	100	101	7.7	-0.1	344	320	620	312	373	394	1149	265	73	73	73	69	72	-0.028	8.9	0.01
15	2.429	2.436	0.16	0.16	1.32	76	1.95	1.14	76	1.1	89	0.050	100	100	7.7	0	342	320	625	310	370	393	1157	267	73	73	73	70	72	-0.030	9.28	0.01
16	2.593	2.599	0.16	0.16	1.35	76	1.99	1.14	76	1.1	89	0.050	101	101	7.6	-0.1	341	319	629	308	368	393	1158	270	73	73	73	70	72	-0.030	8.95	0.01
17	2.757	2.762	0.16	0.16	1.35	76	1.98	1.13	77	1.1	89	0.050	101	101	7.6	0	339	318	633	306	366	392	1153	271	73	73	73	70	72	-0.030	8.69	0.01
18	2.920	2.924	0.16	0.16	1.34	77	1.98	1.13	77	1.1	89	0.050	100	100	7.5	-0.1	339	317	637	304	364	392	1175	273	73	73	73	70	72	-0.031	9.38	0.01
19	3.083	3.086	0.16	0.16	1.34	77	1.98	1.13	77	1.1	89	0.050	100	100	7.4	-0.1	338	316	641	302	362	392	1176	274	73	73	73	70	72	-0.031	8.93	0.01
20	3.247	3.248	0.16	0.16	1.34	77	1.98	1.14	77	1.1	89	0.050	101	100	7.3	-0.1	338	315	645	300	361	392	1168	276	73	73	73	70	72	-0.031	8.67	0.01
21	3.410	3.411	0.16	0.16	1.34	77	1.98	1.13	77	1.1	89	0.050	100	101	7.3	0	338	314	648	299	359	392	1170	276	73	73	73	70	72	-0.031	8.75	0.01
22	3.573	3.574	0.16	0.16	1.35	77	1.99	1.13	77	1.1	90	0.050	100	101	7.2	-0.1	337	313	651	297	357	391	1175	277	73	73	73	70	72	-0.030	8.87	0.01
23	3.736	3.736	0.16	0.16	1.34	77	1.99	1.13	78	1.2	90	0.050	100	100	7.1	-0.1	337	313	654	295	356	391	1179	277	73	73	73	70	72	-0.032	8.59	0.01
24	3.900	3.898	0.16	0.16	1.34	77	1.98	1.13	78	1.1	90	0.050	101	100	7.1	0	336	312	657	294	355	391	1175	279	73	73	73	70	72	-0.031	8.9	0.01
25	4.065	4.061	0.17	0.16	1.34	78	1.99	1.14	78	1.2	90	0.050	101	100	7.0	-0.1	336	311	658	292	354	390	1172	280	73	73	73	70	72	-0.031	8.52	0.02
26	4.228	4.224	0.16	0.16	1.34	78	1.98	1.13	78	1.2	89	0.050	100	100	6.9	-0.1	336	310	660	291	353	390	1173	280	73	73	73	70	72	-0.031	8.58	0.02
27	4.391	4.386	0.16	0.16	1.33	78	1.99	1.13	78	1.1	90	0.050	100	100	6.9	0	334	309	662	290	352	389	1194	280	73	73	73	70	72	-0.031	9.33	0.02
28	4.555	4.548	0.16	0.16	1.33	78	1.98	1.14	78	1.1	89	0.050	100	100	6.8	-0.1	334	308	665	288	351	389	1213	280	73	73	73	70	72	-0.031	9.86	0.02
29	4.718	4.710	0.16	0.16	1.34	78	1.99	1.14	78	1.2	90	0.050	100	100	6.7	-0.1	336	307	668	287	350	390	1225	282	73	74	73	70	72	-0.031	9.65	0.02
30	4.882	4.873	0.16	0.16	1.34	78	1.99	1.13	79	1.2	90	0.050	101	100	6.7	0	339	306	671	286	350	390	1225	284	74	74	73	70	72	-0.033	9.88	0.02
31	5.045	5.036	0.16	0.16	1.34	79	1.98	1.13	79	1.1	90	0.050	100	100	6.6	-0.1	343	305	675	285	348	391	1227	285	74	74	73	70	72	-0.033	10.01	0.02
32	5.209	5.198	0.16	0.16	1.35	79	1.99	1.13	79	1.2	91	0.050	100	100	6.5	-0.1	347	304	678	283	348	392	1234	287	74	74	74	70	72	-0.033	10.12	0.02
33	5.372	5.362	0.16	0.16	1.35	79	1.98	1.16	79	1.2	91	0.050	100	101	6.4	-0.1	352	303	681	283	347	393	1244	287	74	74	74	70	72	-0.034	10.05	0.02
34	5.537	5.527	0.17	0.17	1.34	79	1.98	1.17	79	1.2	91	0.050	101	102	6.3	-0.1	355	302	685	282	346	394	1251	290	74	74	74	70	72	-0.033	10.27	0.02
35	5.701	5.692	0.16	0.17	1.34	79	1.98	1.16	79	1.2	91	0.050	100	102	6.3	0	359	301	688	281	346	395	1247	291	74	74	74	70	72	-0.033	10.26	0.02
36	5.864	5.857	0.16	0.17	1.34	79	1.99	1.16	79	1.2	91	0.050	100	102	6.2	-0.1	363	300	691	280	346	396	1241	292	74	74	74	70	72	-0.033	10.07	0.02

Wood Heater Test Data - ASTM E2780 / ASTM E2515

Run: 2
 Manufacturer: Hearth & Home Intrepid IV Catalytic - KJM 2/12/18
 Model: Intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: 04-Jan-18
 Total Sampling Time: 266 min
 Recording Interval: 1 min
 Beginning Clock Time: 11:53
 Background Sample Volume: _____ cubic feet
 Meter Box Y Factor: 0.981 (1) 0.984 (2) _____ (Amb)
 Barometric Pressure: Begin Middle End Average
30.10 30.06 30.08 30.08 "Hg
 OMNI Equipment Numbers: _____

PM Control Modules: 3035, 0036
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Dilution Tunnel H2O: 2.00 percent
 Dilution Tunnel Static: -0.180 "H2O
 Tunnel Area: 0.18635 ft²
 Pitot Tube Cp: 0.98
 Avg. Tunnel Velocity: 13.21 ft/sec.
 Initial Tunnel Flow: 145.5 scfm
 Average Tunnel Flow: 148.4 scfm
 Post-Test Leak Check (1): 0.000 cfm @ 7 in. Hg
 Post-Test Leak Check (2): 0.000 cfm @ 5 in. Hg
 Average Test Piece Fuel Moisture: 20.18 Dry Basis %

Technician Signature: *[Handwritten Signature]*

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.026	0.046	0.048	0.034	0.028	0.042	0.044	0.034	0.050
Temp	88	88	88	88	88	88	88	88	88
V _{straw}	13.24				V _{scant} 15.06			F _p 0.879	

Elapsed Time (min)	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)														Stack Gas Data		
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter 1 Temp (°F)	Meter 1 Vacuum ("Hg)	Orifice dH 2 ("H ₂ O)	Meter 2 Temp (°F)	Meter 2 Vacuum ("Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Avg. Stove Surface	Catalyst Exit	Stack	Filter 1	Dryer Exit 1	Filter 2	Dryer Exit 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)	
37	6.028	6.022	0.16	0.17	1.33	79	1.99	1.16	80	1.2	91	0.050	100	101	6.1	-0.1	367	299	694	280	345	397	1232	292	74	74	74	70	72	-0.033	9.82	0.02	
38	6.191	6.187	0.16	0.17	1.34	80	1.98	1.16	80	1.2	91	0.050	100	101	6.0	-0.1	372	299	696	279	345	398	1229	292	74	74	74	70	72	-0.033	9.79	0.02	
39	6.355	6.352	0.16	0.17	1.33	80	1.99	1.16	80	1.2	91	0.050	100	101	6.0	0	375	298	698	279	345	399	1229	290	74	74	74	70	72	-0.034	9.93	0.02	
40	6.519	6.516	0.16	0.16	1.34	80	1.98	1.16	80	1.2	91	0.050	100	101	5.9	-0.1	379	297	699	279	345	400	1228	292	74	74	74	70	72	-0.033	9.96	0.02	
41	6.683	6.681	0.16	0.17	1.34	80	1.98	1.16	80	1.2	91	0.050	100	101	5.8	-0.1	383	296	701	278	346	401	1225	291	74	74	74	71	72	-0.033	9.88	0.02	
42	6.847	6.845	0.16	0.16	1.34	80	1.98	1.17	80	1.2	91	0.050	100	101	5.7	-0.1	387	295	702	278	346	402	1219	291	74	74	74	71	72	-0.033	9.65	0.02	
43	7.011	7.011	0.16	0.17	1.34	80	1.98	1.16	80	1.2	91	0.050	100	102	5.7	0	391	294	702	278	346	402	1213	292	74	74	74	71	72	-0.033	9.56	0.02	
44	7.175	7.176	0.16	0.17	1.33	80	1.99	1.16	80	1.2	91	0.050	100	101	5.6	-0.1	394	294	703	278	347	403	1208	291	74	74	74	71	72	-0.032	9.42	0.02	
45	7.340	7.341	0.17	0.17	1.34	80	1.99	1.16	81	1.2	91	0.050	101	101	5.5	-0.1	399	293	703	278	348	404	1207	291	74	74	74	71	72	-0.033	9.57	0.02	
46	7.503	7.506	0.16	0.17	1.34	80	1.98	1.16	81	1.2	91	0.050	100	101	5.5	0	402	292	703	278	348	405	1205	291	74	74	74	71	72	-0.032	9.55	0.01	
47	7.668	7.671	0.17	0.17	1.34	81	1.99	1.17	81	1.2	91	0.050	101	101	5.4	-0.1	405	291	703	278	349	405	1203	291	74	74	74	71	72	-0.033	9.49	0.01	
48	7.832	7.836	0.16	0.17	1.34	81	1.99	1.16	81	1.2	91	0.050	100	101	5.3	-0.1	410	291	703	278	349	406	1202	291	74	74	74	71	72	-0.034	9.65	0.01	
49	7.995	8.001	0.16	0.16	1.33	81	1.98	1.16	81	1.2	92	0.050	100	101	5.3	0	413	290	703	278	350	407	1199	292	74	74	74	71	72	-0.032	9.74	0.01	
50	8.160	8.166	0.17	0.17	1.34	81	1.99	1.17	81	1.2	92	0.050	101	101	5.2	-0.1	417	289	703	278	351	408	1201	292	74	74	74	71	72	-0.033	9.9	0.01	
51	8.324	8.331	0.16	0.16	1.34	81	1.99	1.17	81	1.2	91	0.050	100	101	5.1	-0.1	421	289	702	278	351	408	1205	293	74	74	74	71	72	-0.033	9.86	0.01	
52	8.488	8.496	0.16	0.17	1.34	81	1.99	1.16	81	1.2	92	0.050	100	101	5.1	0	425	288	703	278	352	409	1210	293	74	74	74	71	72	-0.032	10.11	0.02	
53	8.652	8.661	0.16	0.16	1.35	81	1.99	1.17	81	1.2	92	0.050	100	101	5.0	-0.1	429	287	703	278	353	410	1216	293	74	74	74	71	72	-0.032	10.34	0.02	
54	8.817	8.827	0.17	0.17	1.34	81	1.98	1.16	81	1.2	92	0.050	101	102	4.9	-0.1	433	287	703	279	354	411	1215	291	74	74	74	71	72	-0.034	10.17	0.01	
55	8.981	8.993	0.16	0.17	1.35	81	1.99	1.17	82	1.2	92	0.050	100	102	4.9	0	437	286	704	279	354	412	1213	292	74	74	74	71	72	-0.033	10.02	0.01	
56	9.146	9.158	0.17	0.16	1.34	81	1.99	1.16	82	1.2	92	0.050	101	101	4.8	-0.1	442	285	704	279	355	413	1212	292	74	74	74	71	72	-0.033	9.86	0.01	
57	9.310	9.323	0.16	0.17	1.34	81	1.99	1.16	82	1.2	92	0.050	100	101	4.7	-0.1	447	285	704	280	356	414	1224	293	74	74	74	71	72	-0.033	10.35	0.02	
58	9.475	9.488	0.16	0.16	1.34	81	1.99	1.16	82	1.2	92	0.050	101	101	4.7	0	452	284	705	280	357	416	1237	293	74	74	74	71	72	-0.034	10.53	0.02	
59	9.639	9.651	0.16	0.16	1.34	82	1.99	1.14	82	1.2	92	0.050	100	100	4.6	-0.1	457	284	706	281	357	417	1248	293	74	74	74	71	72	-0.033	10.83	0.04	
60	9.804	9.815	0.17	0.16	1.34	82	1.99	1.14	82	1.2	92	0.050	101	101	4.5	-0.1	462	283	708	281	358	418	1253	293	74	74	74	71	73	-0.032	10.91	0.05	
61	9.970	9.979	0.17	0.16	1.34	82	1.98	1.14	82	1.2	92	0.050	101	101	4.4	-0.1	466	283	710	282	359	420	1261	294	74	74	74	71	73	-0.033	11.14	0.06	
62	10.134	10.142	0.16	0.16	1.33	82	1.99	1.14	82	1.2	92	0.050	100	100	4.4	0	470	282	712	283	360	421	1267	294	75	74	74	71	72	-0.034	11.12	0.07	
63	10.298	10.305	0.16	0.16	1.34	82	1.99	1.13	82	1.2	92	0.050	100	100	4.3	-0.1	474	282	714	284	361	423	1274	294	76	75	74	71	73	-0.031	11.32	0.14	
64	10.463	10.469	0.16	0.16	1.34	82	1.99	1.14	82	1.2	92	0.050	101	101	4.2	-0.1	478	281	717	284	361	424	1268	295	76	75	74	71	73	-0.032	10.73	0.06	
65	10.627	10.632	0.16	0.16	1.34	82	1.99	1.14	82	1.2	92	0.050	100	100	4.1	-0.1	484	281	718	285	363	426	1271	296	76	75	74	71	73	-0.033	11.19	0.03	
66	10.792	10.796	0.16	0.16	1.34	82	1.99	1.14	82	1.2	92	0.050	101	101	4.1	0	487	280	720	287	364	428	1275	296	76	75	74	71	73	-0.033	11.34	0.05	
67	10.956	10.960	0.16	0.16	1.34	82	1.99	1.14	82	1.2	92	0.050	100	101	4.0	-0.1	491	280	722	287	364	429	1273	296	76	75	74	71	73	-0.033	10.95	0.05	
68	11.121	11.123	0.17	0.16	1.35	82	2	1.13	83	1.2	92	0.050	101	100	3.9	-0.1	494	280	723	288	366	430	1274	296	76	75	74	71	73	-0.034	11.35	0.14	
69	11.285	11.286	0.16	0.16	1.34	82	2	1.14	83	1.2	92	0.050	100	100	3.8	-0.1	496	279	725	289	366	431	1276	296	76	75	74	71	73	-0.033	11.14	0.07	
70	11.450	11.450	0.16	0.16	1.35	82	1.99	1.14	83	1.2	92	0.050	101	100	3.8	0	497	279	726	291	367	432	1277	296	76	75	75	71	73	-0.033	10.63	0.02	
71	11.614	11.614	0.16	0.16	1.35	82	1.99	1.14	83	1.2	93	0.050	100	100	3.7	-0.1	499	278	728	292	368	433	1272	297	76	75	75	71	73	-0.033	11.16	0.03	
72	11.779	11.778	0.16	0.16	1.34	82	1.99	1.14	83	1.2	93	0.050	101	100	3.6	-0.1	500	278	729	293	369	434	1272	295	76	75	75	71	73	-0.032	10.97	0.04	
73	11.944	11.941	0.17	0.16	1.34	83	1.99	1.14	83	1.2	93	0.050	100	100	3.6	0	500	278	730	294	370	434	1270	295	76	75	75	72	73	-0.033	10.7	0.04	

Wood Heater Test Data - ASTM E2780 / ASTM E2515

Run: 2

Manufacturer: Hearth & Home
Model: Intrepid IV Catalytic
Tracking No.: 2264
Project No.: 0135WS038E
Test Date: 04-Jan-18
Beginning Clock Time: 11:53

Intrepid IV Catalytic - KJM 2/12/18

Total Sampling Time: 266 min
Recording Interval: 1 min

Background Sample Volume: cubic feet

Meter Box Y Factor: 0.981 (1) 0.984 (2) (Amb)

Barometric Pressure: Begin Middle End Average

30.10 30.06 30.08 30.08 "Hg

OMNI Equipment Numbers:

PM Control Modules: 0035, 0036
Dilution Tunnel MW(dry): 29.00 lb/lb-mole
Dilution Tunnel MW(wet): 28.78 lb/lb-mole
Dilution Tunnel H2O: 2.00 percent
Dilution Tunnel Static: -0.180 "H2O
Tunnel Area: 0.18635 ft2
Pitot Tube Cp: 0.98

Avg. Tunnel Velocity: 13.21 ft/sec.
Initial Tunnel Flow: 145.5 scfm
Average Tunnel Flow: 148.4 scfm
Post-Test Leak Check (1): 0.000 cfm @ 7 in. Hg
Post-Test Leak Check (2): 0.000 cfm @ 5 in. Hg
Average Test Piece Fuel Moisture: 20.18 Dry Basis %

Technician Signature: 

Velocity Traverse Data table with columns Pt.1 through Pt.8 and Center, rows for Initial dP, Temp, V_straw, V_scant, and F_p.

Main data table with columns: Elapsed Time, Gas Meter, Sample Rate, Orifice dH, Meter 1 Temp, Meter 1 Vacuum, Orifice dH 2, Meter 2 Temp, Meter 2 Vacuum, Dilution Tunnel Temp, Dilution Tunnel Center dP, Pro. Rate 1, Pro. Rate 2, Scale Reading, Weight Change, Firebox Top, Firebox Bottom, Firebox Back, Firebox Left, Firebox Right, Avg. Stove Surface, Catalyst Exit, Stack, Filter 1, Dryer Exit 1, Filter 2, Dryer Exit 2, Ambient, Draft, CO2, CO.

Wood Heater Test Data - ASTM E2780 / ASTM E2515

Run: 2

Manufacturer: Hearth & Home Intrepid IV Catalytic - KJM 2/12/18

Model: Intrepid IV Catalytic

Tracking No.: 2264

Project No.: 0135WS038E

Test Date: 04-Jan-18

Beginning Clock Time: 11:53

Total Sampling Time: 266 min

Recording Interval: 1 min

Background Sample Volume: cubic feet

Meter Box Y Factor: 0.981 (1) 0.984 (2) (Amb)

Barometric Pressure: Begin Middle End Average

30.10 30.06 30.08 30.08 "Hg

OMNI Equipment Numbers:

PM Control Modules: 3035_0036

Dilution Tunnel MW(dry): 29.00 lb/lb-mole

Dilution Tunnel MW(wet): 28.78 lb/lb-mole

Dilution Tunnel H₂O: 2.00 percent

Dilution Tunnel Static: -0.180 "H₂O

Tunnel Area: 0.19635 ft²

Pitot Tube Cp: 0.98

Avg. Tunnel Velocity: 13.21 ft/sec.

Initial Tunnel Flow: 145.5 scfm

Average Tunnel Flow: 148.4 scfm

Post-Test Leak Check (1): 0.000 cfm @ 7 in. Hg

Post-Test Leak Check (2): 0.000 cfm @ 5 in. Hg

Average Test Piece Fuel Moisture: 20.18 Dry Basis %

Technician Signature: *[Signature]*

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.026	0.046	0.048	0.034	0.028	0.042	0.044	0.034	0.050
Temp	88	88	88	88	88	88	88	88	88
V _{straw}	13.24			ft/sec			V _{scant}	15.06 ft/sec	
F _p	0.879								

Elapsed Time (min)	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)															Stack Gas Data		
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter 1 Temp (°F)	Meter 1 Vacuum ("Hg)	Orifice dH 2 ("H ₂ O)	Meter 2 Temp (°F)	Meter 2 Vacuum ("Hg)	Dilution Tunnel Temp (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Avg. Stove Surface	Catalyst Exit	Stack	Filter 1	Dryer Exit 1	Filter 2	Dryer Exit 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)		
222	36.582	36.409	0.17	0.16	1.35	80	1.98	1.15	81	1.2	79	0.050	100	100	0.6	0	424	266	365	297	322	335	615	194	70	68	70	66	70	-0.011	5.5	0.54		
223	36.747	36.574	0.16	0.16	1.35	80	1.98	1.14	81	1.2	79	0.050	100	100	0.6	0	424	266	364	297	322	335	623	194	70	68	70	66	70	-0.011	5.22	0.6		
224	36.913	36.738	0.17	0.16	1.34	80	1.98	1.15	81	1.2	79	0.050	100	100	0.6	0	424	267	363	297	321	334	630	195	70	68	70	66	70	-0.011	5.22	0.66		
225	37.078	36.902	0.17	0.16	1.36	80	1.98	1.14	81	1.2	79	0.050	100	100	0.6	0	424	267	363	296	321	334	633	195	70	68	70	66	70	-0.011	5.2	0.67		
226	37.243	37.066	0.16	0.16	1.36	80	1.98	1.14	81	1.2	79	0.050	100	100	0.6	0	424	267	362	296	320	334	633	195	70	68	70	66	70	-0.011	5.05	0.67		
227	37.409	37.230	0.17	0.16	1.35	80	1.98	1.15	81	1.2	79	0.050	100	100	0.5	-0.1	423	267	362	296	320	334	634	195	70	68	70	66	70	-0.011	5.02	0.68		
228	37.574	37.394	0.16	0.16	1.35	80	1.97	1.15	81	1.2	79	0.050	100	100	0.5	0	422	267	361	296	320	333	632	195	70	68	70	66	70	-0.011	4.87	0.67		
229	37.739	37.558	0.16	0.16	1.35	80	1.99	1.15	81	1.2	80	0.050	100	100	0.5	0	422	267	361	296	319	333	632	196	70	68	70	66	70	-0.012	4.93	0.69		
230	37.904	37.723	0.17	0.16	1.35	80	1.98	1.14	81	1.2	80	0.050	100	100	0.5	0	423	267	360	295	319	333	632	196	70	68	70	66	70	-0.011	5	0.71		
231	38.069	37.887	0.16	0.16	1.35	80	1.98	1.14	81	1.2	80	0.050	100	100	0.5	0	423	267	360	295	319	333	632	195	70	68	70	66	70	-0.012	4.92	0.71		
232	38.234	38.050	0.16	0.16	1.35	81	1.98	1.14	81	1.2	80	0.050	100	99	0.5	0	422	267	359	295	318	332	631	195	70	68	70	66	70	-0.012	4.94	0.7		
233	38.400	38.214	0.17	0.16	1.36	81	1.97	1.14	81	1.2	80	0.050	100	100	0.5	0	422	267	359	295	318	332	630	196	70	68	70	66	70	-0.011	4.91	0.7		
234	38.565	38.378	0.16	0.16	1.35	81	1.98	1.15	81	1.2	80	0.050	100	100	0.5	0	422	267	359	295	317	332	629	195	70	68	70	66	70	-0.011	4.87	0.69		
235	38.730	38.542	0.16	0.16	1.35	81	1.98	1.15	81	1.2	80	0.050	100	100	0.4	-0.1	421	267	359	295	317	332	629	195	70	68	70	66	70	-0.011	4.87	0.7		
236	38.895	38.707	0.17	0.16	1.35	81	1.98	1.14	81	1.1	80	0.050	100	100	0.4	0	421	267	359	295	316	332	630	195	70	68	70	66	70	-0.012	4.83	0.71		
237	39.061	38.871	0.17	0.16	1.36	81	1.98	1.14	81	1.2	80	0.050	100	100	0.4	0	420	267	358	295	316	331	625	195	70	68	70	66	70	-0.012	4.81	0.7		
238	39.226	39.035	0.16	0.16	1.36	81	1.98	1.14	81	1.2	80	0.050	100	100	0.4	0	419	267	358	295	315	331	613	195	70	68	70	66	70	-0.011	4.98	0.57		
239	39.391	39.199	0.16	0.16	1.36	81	1.98	1.14	81	1.2	80	0.050	100	100	0.4	0	417	267	358	295	315	330	612	193	70	68	70	66	70	-0.011	4.76	0.57		
240	39.556	39.362	0.16	0.16	1.36	81	1.98	1.15	81	1.2	80	0.050	100	99	0.4	0	415	267	357	295	314	330	613	193	70	68	70	66	70	-0.011	4.76	0.61		
241	39.722	39.527	0.17	0.16	1.36	81	1.98	1.14	81	1.2	80	0.050	100	100	0.4	0	414	267	357	295	314	329	614	193	70	68	70	66	70	-0.011	4.69	0.63		
242	39.887	39.691	0.16	0.16	1.36	81	1.98	1.15	81	1.2	80	0.050	100	100	0.4	0	411	268	356	295	313	329	615	193	70	68	70	66	70	-0.011	4.65	0.65		
243	40.052	39.855	0.16	0.16	1.36	81	1.98	1.14	81	1.2	80	0.050	100	100	0.3	-0.1	409	268	356	295	312	328	616	193	70	68	70	66	70	-0.011	4.65	0.67		
244	40.217	40.019	0.16	0.16	1.36	81	1.98	1.14	81	1.2	80	0.050	100	100	0.3	0	407	268	356	295	311	327	618	193	70	68	70	66	70	-0.011	4.61	0.7		
245	40.383	40.183	0.17	0.16	1.36	81	1.98	1.14	81	1.2	80	0.050	100	100	0.3	0	406	268	356	295	311	327	619	193	71	68	70	66	70	-0.011	4.51	0.69		
246	40.548	40.347	0.16	0.16	1.36	81	1.99	1.14	81	1.2	80	0.050	100	100	0.3	0	404	268	355	295	310	326	617	193	71	68	70	66	70	-0.011	4.52	0.7		
247	40.714	40.511	0.17	0.16	1.36	81	1.98	1.15	81	1.2	80	0.050	100	100	0.3	0	401	269	355	295	309	326	618	193	71	68	71	66	71	-0.011	4.37	0.7		
248	40.879	40.675	0.16	0.16	1.36	81	1.98	1.15	81	1.2	80	0.050	100	100	0.3	0	400	269	354	295	309	325	619	193	71	68	71	66	70	-0.011	4.41	0.74		
249	41.045	40.840	0.17	0.17	1.35	81	1.98	1.15	81	1.2	80	0.050	100	100	0.3	0	399	269	354	295	308	325	617	193	71	68	71	66	70	-0.011	4.34	0.74		
250	41.210	41.003	0.16	0.16	1.36	81	1.98	1.13	81	1.2	80	0.050	100	99	0.3	0	398	269	353	295	307	324	621	192	71	68	71	66	70	-0.011	4.29	0.77		
251	41.375	41.167	0.16	0.16	1.36	81	1.99	1.15	81	1.2	80	0.050	100	100	0.3	0	398	269	353	295	306	324	621	192	71	68	71	66	70	-0.011	4.34	0.78		
252	41.541	41.331	0.17	0.16	1.36	81	1.98	1.14	81	1.2	80	0.050	100	100	0.2	-0.1	396	269	353	295	305	324	620	192	71	68	71	66	71	-0.011	4.33	0.77		
253	41.706	41.495	0.17	0.16	1.36	81	1.99	1.15	81	1.2	80	0.050	100	100	0.2	0	395	269	353	295	305	323	618	192	71	68	71	66	70	-0.011	4.11	0.78		
254	41.871	41.659	0.16	0.16	1.36	81	1.99	1.14	81	1.2	80	0.050	100	100	0.2	0	393	269	352	295	304	323	612	192	71	68	71	66	71	-0.011	4.06	0.75		
255	42.036	41.824	0.16	0.16	1.35	81	1.98	1.14	81	1.2	80	0.050	100	100	0.2	0	391	269	352	295	303	322	610	191	71	68	71	66	70	-0.010	3.94	0.76		
256	42.202	41.987	0.17	0.16	1.36	81	1.98	1.15	81	1.2	80	0.050	100	99	0.2	0	389	269	351	295	302	321	610	192	71	68	71	66	71	-0.011	3.95	0.8		
257	42.367	42.151	0.16	0.16	1.34	81	1.98	1.14	81	1.2	80	0.050	100	100	0.2	0	387	269	350	295	302	321	606	191	71	68	71	66	71	-0.010	4.07	0.72		
258	42.532	42.315	0.16	0.16	1.35	81	1.98	1.15	81	1.2	80	0.050	100	100	0.2	0	385	269	350	294	301	320	603	191	71	68	71	66	71	-0.010	4.09	0.73		

Wood Heater Test Data - ASTM E2780 / ASTM E2515

Run: 2

Manufacturer: Hearth & Home Intrepid IV Catalytic - KJM 2/12/18
 Model: Intrepid IV Catalytic
 Tracking No.: 2264 Total Sampling Time: 266 min
 Project No.: 0135WS038E Recording Interval: 1 min
 Test Date: 04-Jan-18
 Beginning Clock Time: 11:53 Background Sample Volume: _____ cubic feet
 Meter Box Y Factor: 0.981 (1) 0.984 (2) _____ (Amb)
 Barometric Pressure: Begin Middle End Average
30.10 30.06 30.08 30.08 "Hg
 OMNI Equipment Numbers: _____

PM Control Modules: 2035, 0036
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole Avg. Tunnel Velocity: 13.21 ft/sec.
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole Initial Tunnel Flow: 145.5 scfm
 Dilution Tunnel H2O: 2.00 percent Average Tunnel Flow: 148.4 scfm
 Dilution Tunnel Static: -0.180 "H2O Post-Test Leak Check (1): 0.000 cfm @ 7 in. Hg
 Tunnel Area: 0.18635 ft² Post-Test Leak Check (2): 0.000 cfm @ 5 in. Hg
 Pitot Tube Cp: 0.98 Average Test Piece Fuel Moisture: 20.18 Dry Basis %

Technician Signature: [Signature]

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.026	0.046	0.048	0.034	0.028	0.042	0.044	0.034	0.050
Temp	88	88	88	88	88	88	88	88	88
V _{straw}	13.24			ft/sec			V _{scant}	15.06	
							ft/sec	F _p	0.879

Elapsed Time (min)	Particulate Sampling Data												Fuel Weight (lb)		Temperature Data (°F)											Stack Gas Data						
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter 1 Temp (°F)	Meter 1 Vacuum ("Hg)	Orifice dH 2 ("H ₂ O)	Meter 2 Temp (°F)	Meter 2 Vacuum ("Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Avg. Stove Surface	Catalyst Exit	Stack	Filter 1	Dryer Exit 1	Filter 2	Dryer Exit 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
259	42.697	42.479	0.17	0.16	1.35	81	1.99	1.15	81	1.2	80	0.050	100	100	0.2	0	383	269	349	294	300	319	599	190	71	68	71	66	70	-0.010	3.97	0.7
260	42.862	42.643	0.16	0.16	1.35	81	1.98	1.14	81	1.2	80	0.050	100	100	0.1	-0.1	381	269	349	294	300	319	596	190	71	68	71	66	70	-0.011	3.81	0.7
261	43.028	42.808	0.17	0.16	1.35	81	1.98	1.14	81	1.2	80	0.050	100	100	0.1	0	380	269	348	294	299	318	595	190	71	68	71	66	70	-0.010	3.71	0.7
262	43.193	42.971	0.16	0.16	1.35	81	1.99	1.14	81	1.2	80	0.050	100	99	0.1	0	377	269	347	294	298	317	593	190	71	68	71	66	71	-0.011	3.7	0.7
263	43.358	43.135	0.16	0.16	1.35	81	1.99	1.14	81	1.2	80	0.050	100	100	0.1	0	375	269	346	294	297	316	591	189	71	68	71	66	71	-0.011	3.56	0.71
264	43.523	43.299	0.17	0.16	1.35	81	1.98	1.15	81	1.2	80	0.050	100	100	0.1	0	373	268	346	293	297	315	586	189	71	68	71	66	71	-0.010	3.45	0.69
265	43.689	43.462	0.17	0.16	1.36	81	1.99	1.14	81	1.2	80	0.050	100	99	0.1	0	371	268	345	293	295	314	580	188	71	68	71	66	71	-0.010	3.37	0.67
266	43.854	43.627	0.16	0.16	1.35	81	1.97	1.14	81	1.2	80	0.050	100	100	0.0	-0.1	368	268	344	293	295	314	575	188	71	68	71	66	70	-0.010	3.27	0.67
Avg/Tot	43.854	43.627	0.16	0.16	1.35	81		1.14	82		85	0.050	100	100								107.4			72	72	69	71	-0.022			

Wood Heater Lab Data - ASTM E2780 / ASTM E2515

Intrepid IV Catalytic - KJM 2/12/18

Manufacturer: Hearth & Home Equipment Numbers: _____
 Model: Intrepid IV Catalytic _____
 Tracking No.: 2264 _____
 Project No.: 0135WS038E _____
 Run #: 2 _____
 Date: 1/4/18 _____

TRAIN 1 (First Hour emissions)

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
B. Front filter catch	Filter	D336	111.7	111.2	0.5
C. Rear filter catch	Filter				0.0
D. Probe catch*	Probe				0.0
E. Filter seals catch*	Seals				0.0

Sub-Total Total Particulate, mg: **0.5**

TRAIN 1 (Post First Hour Change-out)

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
B. Front filter catch	Filter	D337	111.6	111.6	0.0
C. Rear filter catch	Filter	D338	111.3	111.3	0.0
D. Probe catch*	Probe	28	114751.7	114751.7	0.0
E. Filter seals catch*	Seals	R553	3349.9	3349.5	0.4

Sub-Total Total Particulate, mg: **0.4**

Train 1 Aggregate Total Particulate, mg: **0.9**

TRAIN 2

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	D339	112.7	111.9	0.8
B. Rear filter catch	Filter	D340	111.6	111.7	-0.1
C. Probe catch*	Probe	29	114278.6	114278.7	0.0
D. Filter seals catch*	Seals	R554	3267.3	3267.0	0.3

Total Particulate, mg: 1.0

AMBIENT

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch*	Filter				0.0

Total Particulate, mg: 0.0

*Particulate catch that results in a negative number, is assumed to be zero for probes and seals, negative numbers for filters are assumed to be part of the seal weight.

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Technician Signature:

Wood Heater Test Results - ASTM E2780 / ASTM E2515

Manufacturer: Hearth & Home Intrepid IV Catalytic - KJM 2/12/18
 Model: Intrepid IV-Catalytic
 Project No.: 0135WS038E
 Tracking No.: 2264
 Run: 2
 Test Date: 01/04/18

Burn Rate	0.73 kg/hr dry
Average Tunnel Temperature	85 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	13.21 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8902.0 dscf/hour
Average Delta p	0.050 inches H2O
Total Time of Test	266 minutes

	AMBIENT	SAMPLE TRAIN 1	SAMPLE TRAIN 2	FIRST HOUR FILTER (TRAIN 1)
Total Sample Volume - Vm	0.000 cubic feet	43.854 cubic feet	43.627 cubic feet	9.804 cubic feet
Average Gas Meter Temperature	71 degrees Fahrenheit	81 degrees Fahrenheit	82 degrees Fahrenheit	78 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	0.000 dscf	42.309 dscf	42.176 dscf	9.512 dscf
Total Particulates - m _T	0 mg	0.9 mg	1 mg	0.5 mg
Particulate Concentration (dry-standard) - C _T /C _s	0.000000 grams/dscf	0.00002 grams/dscf	0.00002 grams/dscf	0.00005 grams/dscf
Total Particulate Emissions - E _T	0.00 grams	0.84 grams	0.94 grams	0.47 grams
Particulate Emission Rate	0.00 grams/hour	0.19 grams/hour	0.21 grams/hour	0.47 grams/hour
Emissions Factor		0.26 g/kg	0.29 g/kg	0.31 g/kg
Difference from Average Total Particulate Emissions		0.05 grams	0.05 grams	

Dual Train Comparison Results Are Acceptable

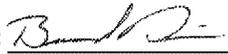
FINAL AVERAGE RESULTS	
Complete Test Run	
Total Particulate Emissions - E _T	0.89 grams
Particulate Emission Rate	0.20 grams/hour
Emissions Factor	0.27 grams/kg
First Hour Emissions	
Total Particulate Emissions - E _T	0.47 grams
Particulate Emission Rate	0.47 grams/hour
Emissions Factor	0.31 grams/kg
7.5% of Average Total Particulate Emissions	0.07 grams

QUALITY CHECKS	
Filter Temps < 90 °F	OK
Filter Face Velocity (47 mm)	OK
Dryer Exit Temp < 80F	OK
Leakage Rate	OK
Ambient Temp (55-90°F)	OK
Negative Probe Weight Eval.	OK
Pro-Rate Variation	OK
Stove Surface ΔT	OK

Technician Signature: 

Wood Heater Efficiency Results - CSA B415.1

Manufacturer: Hearth & Home
Model: repiod IV Catalytic
Date: 01/04/18
Run: 2
Control #: 0135WS038E
Test Duration: 266
Output Category: I

Technician Signature: 

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	78.4%	84.7%
Combustion Efficiency	97.7%	97.7%
Heat Transfer Efficiency	80%	86.7%

Output Rate (kJ/h)	11,243	10,665	(Btu/h)
Burn Rate (kg/h)	0.72	1.60	(lb/h)
Input (kJ/h)	14,339	13,602	(Btu/h)

Test Load Weight (dry kg)	3.21	7.07	dry lb
MC wet (%)	16.79147945		
MC dry (%)	20.18		
Particulate (g)	0.20		
CO (g)	124		
Test Duration (h)	4.43		

Emissions	Particulate	CO
g/MJ Output	0.00	2.50
g/kg Dry Fuel	0.06	38.79
g/h	0.05	28.08
lb/MM Btu Output	0.01	5.80

Air/Fuel Ratio (A/F)	15.64
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VERSION: 2.2 12/14/2009

Client: Hearth & Home

Project Number: 0135WS038E

Run Number: 2

Model: Intrepid IV Catalytic

Tracking Number: 2264

Date: 1/4/18

Test Crew: D Davis

OMNI Equipment ID numbers: _____

ASTM E2515 Lab Sheet

Assembled By:

D Davis

Date/Time in Dessicator:

1/4/18 1645

Weighing #1	Weighing #2	Weighing #3	Weighing #4	Weighing #5
Date/Time: <u>1/9/18 0840</u>	Date/Time: <u>1/9/18 0820</u>	Date/Time:	Date/Time:	Date/Time:
R/H %: <u>8.9</u>	R/H %: <u>6.7</u>	R/H %:	R/H %:	R/H %:
Temp: <u>71.2</u>	Temp: <u>62.9</u>	Temp:	Temp:	Temp:
200 mg Audit: <u>0.2000</u>	200 mg Audit: <u>0.2000</u>	200 mg Audit:	200 mg Audit:	200 mg Audit:
2 g Audit: <u>2.0000</u>	2 g Audit: <u>1.9999</u>	2 g Audit:	2 g Audit:	2 g Audit:
100 g Audit: <u>99.9977</u>	100 g Audit: <u>99.9980</u>	100 g Audit:	100 g Audit:	100 g Audit:
Initials: <u>DA</u>	Initials: <u>DA</u>	Initials:	Initials:	Initials:

Train	Element	ID #	Tare (mg)	Weight (mg)				
A (First Hour)	Front Filter	D336	111.2	111.8	111.7			
	Rear Filter							
	Probe							
	O-Ring Set							
A (Remainder)	Front Filter	D337	111.6	111.7	111.6			
	Rear Filter	D338	111.3	111.3	111.3			
	Probe	24	114751.7	114751.8	114751.7			
	O-Ring Set	R553	3349.5	3349.9	3349.9			
B	Front Filter	D339	111.9	112.8	112.7			
	Rear Filter	D340	111.7	111.6	111.6			
	Probe	29	114278.7	114278.5	114278.6			
	O-Ring Set	R554	3267.0	3267.4	3267.3			
BG	Filter							

Technician Signature: DA

Date: 1/23/18

ASTM E2780 Wood Heater Run Sheets

Project Number: 0135WS038E Run Number: 2

Model: Intrepid IV Catalytic

Tracking Number: 2264

Date: 1/4/18

Test Crew: D Davis

OMNI Equipment ID numbers: _____

Wood Heater Supplemental Data

Start Time: 11:53

Booth #: E1

Stop Time: 16:19

Stack Gas Leak Check:

Initial: good Final: good

Sample Train Leak Check:

A: 0.0 @ 7 "Hg
 B: 0.0 @ 5 "Hg

Calibrations: Span Gas

CO₂: 16.74 CO: 4.20 / 901

	Pre Test		Post Test	
	Zero	Span	Zero	Span
Time	<u>11:28</u>	<u>11:28</u>	<u>16:21</u>	<u>16:21</u>
CO ₂	<u>0.00</u>	<u>16.74</u>	<u>0.00</u>	<u>16.73</u>
CO	<u>0.000 / 0</u>	<u>4.200 / 900</u>	<u>0.000 / 0</u>	<u>4.197 / 901</u>

Air Velocity (ft/min): Initial: < 50 Final: < 50

Scale Audit (lbs): Initial: 10.0 Final: 10.0

Pitot Tube Leak Test: Initial: good Final: good

Stack Diameter (in): 6"

Induced Draft: 0.0

% Smoke Capture: 100%

Flue Pipe Cleaned Prior to First Test in Series:

Date: 1/3/18 Initials: AD

	Initial	Middle	Ending
P _b (in/Hg)	<u>30.10</u>	<u>30.06</u>	<u>30.08</u>
RH (%)	<u>15.8</u>	<u>15.1</u>	<u>15.9</u>
Ambient (°F)	<u>72</u>	<u>72</u>	<u>70</u>

Tunnel Traverse		
Microtector Reading	dP (in H ₂ O)	T(°F)
1	<u>.026</u>	<u>88</u>
2	<u>.046</u>	<u>88</u>
3	<u>.048</u>	<u>88</u>
4	<u>.034</u>	<u>88</u>
1	<u>.028</u>	<u>88</u>
2	<u>.042</u>	<u>88</u>
3	<u>.044</u>	<u>88</u>
4	<u>.034</u>	<u>88</u>
Center:		
	<u>.050</u>	<u>88</u>

Background Filter Volume: N/A

Tunnel Static Pressure (in H ₂ O):	
Beginning of Test	End of Test
<u>-.18</u>	<u>-.18</u>

Technician Signature: AD

Date: 1/23/18

Client: Hearth & Home Project Number: 0135WS038E Run Number: 2

Model: Intrepid IV Catalytic Tracking Number: 2264 Date: 1/4/18

Test Crew: B Davis

OMNI Equipment ID numbers: _____

Wood Heater Fuel Data

Fuel: Douglas fir, untreated and air dried, standard grade or better dimensional lumber

Pre-Burn Fuel

Calibration: Cal Value (1) = 12% Actual Reading 12
 Cal Value (2) = 22% Actual Reading 22

Piece:	Length:	Reading:	Piece:	Length:	Reading:
1	<u>32</u> in	<u>23.8</u>	7	_____ in	_____
2	<u>32</u> in	<u>22.2</u>	8	_____ in	_____
3	<u>28</u> in	<u>22.3</u>	9	_____ in	_____
4	<u>28</u> in	<u>22.2</u>	10	_____ in	_____
5	_____ in	_____	11	_____ in	_____
6	_____ in	_____	12	_____ in	_____

Total Pre-Burn Fuel Weight: 13.4 Pre-Burn Fuel Average Moisture: 22.63

Time (clock): 0840 Room Temperature (F): 70 Initials: BD

Test Fuel

Firebox Volume (ft³): 1.31 Test Fuel Piece Length (in): 13.5
 Load Weight Range (lb): 8.5 Total Wet Fuel Load Weight (lb): 8.5
7.25 - 9.75 - 10.25

Fuel Type & Amount: 2 x 4: 5 4 x 4: 0
 Weight (with spacers): 8.5 Weight (with spacers): 0

Piece:	Weight (lbs):	Moisture Readings (%DB):		Fuel Type:
1	<u>22.4</u>	<u>19.4</u>	<u>22.7</u>	<u>2x4</u>
2	<u>1.3</u>	<u>19.2</u>	<u>20.1</u>	<u>2x4</u>
3	<u>1.2</u>	<u>20.2</u>	<u>18.6</u>	<u>2x4</u>
4	<u>1.1</u>	<u>21.6</u>	<u>18.9</u>	<u>2x4</u>
5	<u>1.3</u>	<u>23.1</u>	<u>18.9</u>	<u>2x4</u>
6	_____	_____	_____	_____
7	_____	_____	_____	_____

Spacer Moisture Readings (%DB)

<u>6.7</u>	<u>21.3</u>	<u>20.8</u>	<u>22.0</u>	<u>20.5</u>	_____	_____
<u>8.0</u>	<u>19.3</u>	<u>19.3</u>	<u>18.3</u>	<u>18.2</u>	_____	_____
<u>8.0</u>	<u>19.2</u>	<u>18.5</u>	<u>20.6</u>	<u>19.2</u>	_____	_____
<u>11.4</u>	<u>13.9</u>	<u>19.1</u>	<u>18.8</u>	<u>16.1</u>	_____	_____

Technician Signature: 1025 Room Temperature (F): 70 Date: 1/23/18 Initials: BD

Client: Hearth & Home Project Number: 0135WS038E Run Number: 2

Model: Intrepid IV Catalytic Tracking Number: 2264 Date: 1/4/18

Test Crew: B Davis

OMNI Equipment ID numbers: _____

Wood Heater Run Notes

Air Control Settings

Primary: _____

Secondary: fixed

Air control fully closed,
Pushed to the Right.

Tertiary/Pilot: N/A

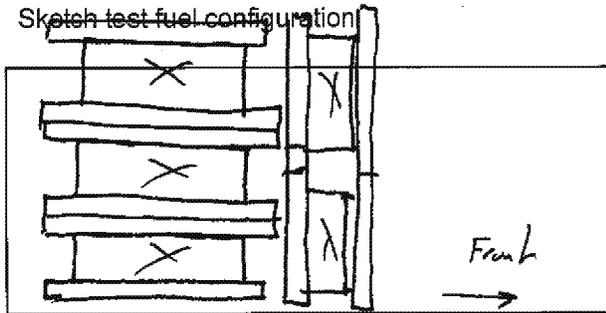
Fan: N/A

Preburn Notes

Time	Notes
10	Raked coals
30	Raked coals
50	Raked coals
70	Raked coals
105	Raked coals
106	Removed 0.3 lbs of coals

Test Notes

Sketch test fuel configuration



Start up procedures & Timeline:

Bypass: closed by 1:00

Fuel loaded by: 53 seconds

Door closed at: 57 seconds

Primary air: At test setting entire test

Notes: N/A

Time	Notes
60	changed front filter in train A

Technician Signature: [Signature]

Date: 1/23/18

*Model: Intrepid FlexBurn Catalytic
Hearth and Home Technologies
352 Mountain House Road
Halifax, PA 17032*

Run 3

Wood Heater Preburn Data - ASTM E2780

Intrepid IV Catalytic - KJM 2/12/18

Run: 3

Technician Signature:

Manufacturer: Hearth & Home
 Model: Intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: 1/5/18
 Beginning Clock Time: 10:07

Preburn Fuel Data	
Fuel Piece Lengths (in.):	6
Total Preburn Weight (lb):	13.5
	19.9
Fuel Moisture Readings (% DB):	22.4
	20.2
Avg Preburn Moisture (% DB):	20.83

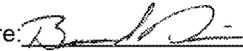
Coal Bed Range (lb):	1.7	2.1
	(min)	(max)

Elapsed Time (min)	Scale (lb)	Stack Draft (in H ₂ O)	Temperatures (°F)							
			FB Top	FB Bottom	FB Back	FB Left	FB Right	Avg. FB	Stack	Ambient
0	10	-0.075	318	144	354	246	184	249.2	994	72
1	9.8	-0.066	336	149	386	250	190	262.2	611	72
2	9.7	-0.059	341	154	417	254	195	272.2	496	72
3	9.6	-0.055	342	159	442	258	200	280.2	436	72
4	9.5	-0.052	342	164	463	262	206	287.4	404	72
5	9.5	-0.05	343	170	481	266	210	294	385	72
6	9.4	-0.05	342	175	498	269	215	299.8	375	71
7	9.3	-0.049	343	180	514	272	219	305.6	368	72
8	9.2	-0.048	343	185	530	275	222	311	366	72
9	9.1	-0.048	345	190	544	277	226	316.4	365	71
10	9	-0.048	347	195	560	280	229	322.2	367	71
11	8.8	-0.05	346	200	569	282	231	325.6	432	71
12	8.7	-0.051	355	205	584	284	234	332.4	390	72
13	8.5	-0.05	363	210	601	286	236	339.2	384	71
14	8.4	-0.05	371	214	619	288	238	346	382	71
15	8.2	-0.049	378	219	638	290	240	353	385	71
16	8.1	-0.05	385	223	656	294	242	360	389	72
17	8	-0.049	392	227	673	299	244	367	389	72
18	7.9	-0.05	398	231	687	303	245	372.8	390	71
19	7.8	-0.048	406	234	698	306	247	378.2	389	71
20	7.6	-0.048	412	238	707	308	249	382.8	386	72
21	7.5	-0.046	423	241	716	311	251	388.4	386	71
22	7.4	-0.048	437	244	726	314	252	394.6	388	72
23	7.3	-0.048	454	247	734	317	254	401.2	388	71
24	7.2	-0.048	475	250	742	320	257	408.8	391	72
25	7	-0.048	496	253	750	323	260	416.4	390	72
26	6.9	-0.048	514	255	756	326	262	422.6	390	72
27	6.8	-0.048	529	258	763	329	265	428.8	391	72
28	6.7	-0.049	545	260	768	333	268	434.8	395	72
29	6.5	-0.049	561	263	774	336	271	441	395	72
30	6.4	-0.048	576	265	779	339	275	446.8	394	72
31	0.2	-0.088	585	266	782	342	279	450.8	983	72
32	5.8	-0.059	595	269	789	344	282	455.8	562	72
33	5.7	-0.055	606	271	792	347	286	460.4	471	72
34	5.5	-0.052	610	272	794	349	291	463.2	436	72
35	5.4	-0.052	607	274	797	351	297	465.2	418	72
36	5.2	-0.05	605	276	801	354	304	468	412	72
37	5.1	-0.05	606	277	805	356	310	470.8	408	72
38	5	-0.049	605	279	810	359	317	474	405	72

Wood Heater Preburn Data - ASTM E2780

Intrepid IV Catalytic - KJM 2/12/18

Run: 3

Technician Signature: 

Manufacturer: Hearth & Home
 Model: Intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: 1/5/18
 Beginning Clock Time: 10:07

Preburn Fuel Data	
Fuel Piece Lengths (in.):	6
Total Preburn Weight (lb):	13.5
Fuel Moisture Readings (% DB):	19.9
	22.4
	20.2
Avg Preburn Moisture (% DB):	20.83

Coal Bed Range (lb):	1.7	2.1
	(min)	(max)

Elapsed Time (min)	Scale (lb)	Stack Draft (in H ₂ O)	Temperatures (°F)							
			FB Top	FB Bottom	FB Back	FB Left	FB Right	Avg. FB	Stack	Ambient
39	4.9	-0.048	605	280	813	360	323	476.2	401	72
40	4.8	-0.049	602	281	816	362	330	478.2	399	72
41	4.7	-0.047	600	282	818	364	336	480	395	72
42	4.6	-0.046	597	283	819	365	343	481.4	395	72
43	4.5	-0.047	590	284	823	367	348	482.4	395	72
44	4.4	-0.047	587	285	826	367	354	483.8	393	72
45	4.3	-0.047	584	286	829	368	359	485.2	392	72
46	4.2	-0.046	582	288	831	369	365	487	388	72
47	4.1	-0.046	580	289	831	370	369	487.8	387	72
48	4	-0.045	579	290	831	371	374	489	387	72
49	3.9	-0.045	579	291	829	371	379	489.8	383	72
50	3.9	-0.044	581	293	827	372	384	491.4	382	72
51	3.8	-0.044	582	294	824	372	388	492	378	72
52	3.7	-0.045	584	295	820	373	393	493	375	73
53	3.6	-0.049	576	297	809	374	398	490.8	557	72
54	3.4	-0.047	589	298	807	375	402	494.2	422	73
55	3.3	-0.046	608	300	807	376	406	499.4	390	72
56	3.2	-0.047	620	301	809	377	410	503.4	378	72
57	3.2	-0.046	627	302	812	378	413	506.4	372	72
58	3.1	-0.043	625	303	815	380	416	507.8	368	72
59	3	-0.042	622	304	818	382	418	508.8	367	72
60	2.9	-0.043	619	305	820	383	421	509.6	364	72
61	2.9	-0.041	620	307	820	384	423	510.8	363	72
62	2.8	-0.041	614	307	819	385	425	510	359	73
63	2.8	-0.041	608	308	817	386	427	509.2	356	73
64	2.7	-0.039	601	309	813	387	428	507.6	336	73
65	2.7	-0.04	594	310	807	388	430	505.8	341	72
66	2.7	-0.038	586	311	800	388	431	503.2	344	72
67	2.6	-0.037	581	312	791	388	433	501	340	73
68	2.6	-0.038	576	313	782	389	434	498.8	339	73
69	2.6	-0.037	571	314	773	389	435	496.4	338	73
70	2.5	-0.036	566	315	763	389	436	493.8	337	73
71	2.6	-0.072	566	316	752	389	437	492	367	72
72	2.4	-0.038	557	317	740	390	438	488.4	382	72
73	2.4	-0.038	556	318	733	390	438	487	344	73
74	2.4	-0.036	557	319	726	391	438	486.2	334	73
75	2.4	-0.036	557	320	719	391	439	485.2	327	73
76	2.3	-0.035	556	321	712	392	439	484	324	73
77	2.3	-0.035	556	321	704	393	439	482.6	321	73

Wood Heater Preburn Data - ASTM E2780

Run: 3

Intrepid IV Catalytic - KJM 2/12/18

Technician Signature: 

Manufacturer: Hearth & Home
 Model: Intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: 1/5/18
 Beginning Clock Time: 10:07

Preburn Fuel Data	
Fuel Piece Lengths (in.):	<u>6</u>
Total Preburn Weight (lb):	<u>13.5</u>
	<u>19.9</u>
Fuel Moisture Readings (% DB):	<u>22.4</u>
	<u>20.2</u>
	<u> </u>
	<u> </u>
Avg Preburn Moisture (% DB):	<u>20.83</u>

Coal Bed	<u>1.7</u>	<u>2.1</u>
Range (lb):	(min)	(max)

Elapsed Time (min)	Scale (lb)	Stack Draft (in H ₂ O)	Temperatures (°F)							
			FB Top	FB Bottom	FB Back	FB Left	FB Right	Avg. FB	Stack	Ambient
78	2.3	-0.034	555	322	696	393	439	481	320	73
79	2.3	-0.034	555	323	689	394	439	480	318	73
80	2.3	-0.034	555	324	682	395	439	479	317	73
81	2.2	-0.034	555	324	675	396	438	477.6	317	73
82	2.2	-0.033	556	325	668	397	438	476.8	315	73
83	2.2	-0.033	555	325	661	397	438	475.2	315	73
84	2.2	-0.032	555	326	654	398	437	474	314	73
85	2.1	-0.032	554	326	648	399	436	472.6	313	73
86	2.1	-0.032	553	326	642	400	436	471.4	313	73
87	2.1	-0.031	554	327	636	401	435	470.6	313	73
88	2.1	-0.032	554	327	630	402	434	469.4	311	73
89	2	-0.031	553	328	624	402	433	468	309	73
90	2	-0.031	553	328	618	403	433	467	311	72

Wood Heater Test Fuel Data - ASTM E2780

Manufacturer: **Hearth & Home** Intrepid IV Catalytic - KJM 2/12/18
 Model: **Intrepid IV Catalytic**
 Tracking No.: **2264**
 Project No.: **0135WS038E**
 Test Date: **1/5/2018**
 Run No.: **3**

Firebox Volume (ft ³):	1.31
Fuel Piece Length (in):	13.5
2x4 Crib Weight (lb):	8.5
4x4 Crib Weight (lb):	0

Total Fuel Weight (Dry Basis, lb):	7.1	
Fuel Density (lb/ft ³ , Dry Basis):	25.81	OK
Loading Density (lb/ft ³ , Wet Basis):	6.49	OK
2x4 Percentage:	N/A	N/A

Coal Bed Range (20-25%): **1.7 - 2.125**

Test Fuel Piece	Weight (lb)	Size	Readings (Dry Basis %)			Dry Weight (lb)
1	1.4	2"x 4"	22.5	22.0	22.2	1.15
2	1.2	2"x 4"	19.2	20.3	19.9	1.00
3	1.3	2"x 4"	20.3	21.6	22.0	1.07
4	1.2	2"x 4"	22.4	21.4	22.6	0.98
5	1.3	2"x 4"	19.3	18.6	19.2	1.09

Spacer Readings (Dry Basis %)			
17.3	14.9		
13.9	15.0		
20.4	16.2		
22.8	13.8		
16.4	14.8		
15.3			
20.5			
22.0			
18.2			
15.4			
20.0			
22.0			
18.0			

Technician Signature: 

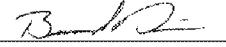
Wood Heater Test Data - ASTM E2780 / ASTM E2515

Run: 3

Manufacturer: Hearth & Home
Model: Intrepid IV Catalytic
Tracking No.: 2264
Project No.: 0135WS038E
Test Date: 05-Jan-18
intrepid IV Catalytic - KJM 2/12/18

Total Sampling Time: 177 min
Recording Interval: 1 min

PM Control Modules: 3035, 0036
Dilution Tunnel MW(dry): 29.00 lb/lb-mole
Dilution Tunnel MW(wet): 28.78 lb/lb-mole
Dilution Tunnel H2O: 2.00 percent
Dilution Tunnel Static: -0.180 "H2O
Tunnel Area: 0.19635 ft2
Pitot Tube Cp: 0.99
Avg. Tunnel Velocity: 13.23 ft/sec.
Initial Tunnel Flow: 144.2 scfm
Average Tunnel Flow: 146.7 scfm
Post-Test Leak Check (1): 0.000 cfm @ 5 in. Hg
Post-Test Leak Check (2): 0.000 cfm @ 7 in. Hg
Average Test Piece Fuel Moisture: 20.90 Dry Basis %

Technician Signature: 

Meter Box Y Factor: 0.981 (1) 0.984 (2) (Amb)

Barometric Pressure: Begin Middle End Average
30.12 30.12 30.11 30.12 "Hg

OMNI Equipment Numbers:

Velocity Traverse Data											
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center		
Initial dP	0.026	0.040	0.042	0.044	0.036	0.028	0.048	0.036	0.048		
Temp	96	96	96	96	96	96	96	95	96		
V_{straw}	13.26 ft/sec				V_{scan}				14.85 ft/sec	F_p	0.893

Elapsed Time (min)	Particulate Sampling Data												Fuel Weight (lb)		Temperature Data (°F)														Stack Gas Data			
	Gas Meter 1 (ft³)	Gas Meter 2 (ft³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H2O)	Meter 1 Temp (°F)	Meter 1 Vacuum ("Hg)	Orifice dH 2 ("H2O)	Meter 2 Temp (°F)	Meter 2 Vacuum ("Hg)	Dilution Tunnel Temp (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Avg. Stove Surface	Catalyst Exit	Stack	Filter 1	Dryer Exit 1	Filter 2	Dryer Exit 2	Ambient	Draft ("H2O)	CO2 (%)	CO (%)
0	0.000	0.000	0.16	0.16	1.03	75	1.84	0.65	76	1.1	106	0.048			8.5		548	328	605	404	432	463	927	293	72	69	72	68	73	-0.026	4.9	0.14
1	0.150	0.158	0.16	0.16	1.36	75	2.03	1.13	76	1.1	133	0.048	95	100	8.5	0	531	328	596	405	431	458	901	278	73	73	73	70	73	-0.060	1.4	0.15
2	0.313	0.320	0.16	0.16	1.36	75	2	1.13	76	1.1	100	0.048	101	100	8.4	-0.1	504	328	594	404	429	452	994	288	73	74	73	70	73	-0.028	8.1	0.03
3	0.477	0.482	0.16	0.16	1.35	75	2	1.13	76	1.1	95	0.048	101	100	8.4	0	482	329	593	404	427	447	1047	267	73	74	73	71	73	-0.031	8.27	0.02
4	0.641	0.644	0.16	0.16	1.35	75	2	1.13	76	1.1	93	0.048	100	99	8.3	-0.1	465	329	595	403	425	443	1078	274	73	75	73	71	72	-0.032	8.25	0.02
5	0.805	0.807	0.16	0.16	1.35	75	2	1.16	76	1.2	93	0.048	100	100	8.3	0	451	329	600	401	423	441	1101	282	73	75	73	71	72	-0.033	8.31	0.01
6	0.968	0.971	0.16	0.16	1.34	76	1.99	1.16	76	1.2	93	0.048	100	101	8.2	-0.1	437	329	605	400	419	438	1113	286	73	75	73	71	73	-0.034	8.36	0.01
7	1.131	1.136	0.16	0.17	1.34	76	1.99	1.16	76	1.2	92	0.048	100	101	8.1	-0.1	427	329	611	397	416	436	1128	293	73	75	73	71	72	-0.034	8.42	0.01
8	1.294	1.300	0.16	0.16	1.34	76	1.99	1.16	76	1.2	92	0.048	100	101	8.1	0	426	328	617	395	413	436	1151	300	73	75	73	71	72	-0.036	9.08	0.04
9	1.456	1.465	0.16	0.17	1.34	76	1.99	1.16	76	1.2	93	0.048	99	101	8.0	-0.1	419	328	625	392	409	435	1152	309	73	75	74	71	73	-0.037	8.52	0.08
10	1.619	1.629	0.16	0.16	1.34	76	1.99	1.16	77	1.2	93	0.048	100	100	7.9	-0.1	416	328	631	389	405	434	1152	315	73	75	74	71	72	-0.038	8.36	0.07
11	1.782	1.794	0.16	0.17	1.34	76	1.98	1.16	77	1.2	94	0.048	100	101	7.8	-0.1	434	328	637	386	402	437	1157	321	74	75	74	71	72	-0.039	8.88	0.1
12	1.945	1.958	0.16	0.16	1.33	76	1.98	1.16	77	1.2	94	0.048	100	101	7.7	-0.1	459	327	643	383	398	442	1189	327	74	75	74	71	73	-0.040	9.19	0.46
13	2.107	2.122	0.16	0.16	1.33	76	1.98	1.15	77	1.2	94	0.048	99	101	7.6	-0.1	476	327	648	380	394	445	1169	331	74	75	74	71	72	-0.041	7.86	0.55
14	2.269	2.286	0.16	0.16	1.32	76	1.98	1.15	77	1.2	95	0.048	99	101	7.5	-0.1	486	326	652	377	391	446	1203	335	74	75	74	71	73	-0.041	10.36	0.22
15	2.431	2.449	0.16	0.16	1.32	77	1.99	1.16	77	1.2	95	0.048	99	100	7.4	-0.1	501	325	656	373	388	449	1261	338	74	75	74	71	73	-0.042	11.56	0.15
16	2.593	2.613	0.16	0.16	1.33	77	1.98	1.15	77	1.2	95	0.048	99	101	7.3	-0.1	508	325	662	370	385	450	1265	343	74	75	74	71	73	-0.042	11.52	0.11
17	2.755	2.778	0.16	0.17	1.33	77	1.99	1.15	77	1.2	96	0.048	99	101	7.2	-0.1	513	324	669	368	381	451	1264	347	74	75	74	71	73	-0.044	11.02	0.11
18	2.919	2.942	0.16	0.16	1.32	77	1.98	1.15	78	1.2	96	0.048	100	101	7.1	-0.1	506	323	675	365	379	450	1259	349	74	75	74	71	72	-0.044	10.46	0.26
19	3.081	3.105	0.16	0.16	1.32	77	1.98	1.15	78	1.2	96	0.048	99	100	6.9	-0.2	500	323	680	363	377	449	1251	349	74	75	74	71	73	-0.043	10.28	0.25
20	3.243	3.269	0.16	0.16	1.32	77	1.98	1.14	78	1.2	96	0.048	99	101	6.8	-0.1	498	322	684	360	375	448	1260	349	74	75	74	72	72	-0.043	10.76	0.19
21	3.405	3.433	0.16	0.16	1.32	78	1.98	1.15	78	1.2	96	0.048	99	101	6.7	-0.1	505	321	689	358	373	449	1291	351	74	75	74	72	73	-0.044	11.8	0.1
22	3.567	3.597	0.16	0.16	1.32	78	1.98	1.15	78	1.2	97	0.048	99	101	6.6	-0.1	521	320	696	356	371	453	1315	354	74	75	74	72	72	-0.044	12.09	0.1
23	3.729	3.761	0.16	0.16	1.33	78	1.98	1.15	78	1.2	97	0.048	99	101	6.5	-0.1	540	319	703	354	370	457	1364	359	74	75	74	72	72	-0.045	13.06	0.54
24	3.892	3.925	0.16	0.16	1.32	78	1.99	1.14	78	1.2	97	0.048	100	101	6.3	-0.2	555	318	711	352	369	461	1391	362	74	75	74	72	72	-0.046	13.25	0.78
25	4.054	4.089	0.16	0.16	1.32	78	1.98	1.14	79	1.2	97	0.048	99	100	6.2	-0.1	569	317	719	350	368	465	1413	365	75	75	74	72	72	-0.046	13.24	1
26	4.216	4.252	0.16	0.16	1.31	78	1.98	1.15	79	1.2	98	0.048	99	100	6.1	-0.1	581	316	727	349	367	468	1412	369	75	75	75	72	72	-0.045	13.13	0.76
27	4.378	4.416	0.16	0.16	1.32	79	1.98	1.15	79	1.2	98	0.048	99	101	6.0	-0.1	592	316	736	347	366	471	1406	370	75	75	75	72	72	-0.045	12.93	0.52
28	4.540	4.580	0.16	0.16	1.32	79	1.98	1.15	79	1.2	98	0.048	99	101	5.8	-0.2	601	315	744	346	365	474	1407	371	75	75	75	72	73	-0.045	13.05	0.62
29	4.703	4.745	0.16	0.17	1.32	79	1.98	1.14	79	1.2	99	0.048	100	101	5.7	-0.1	609	314	751	345	364	477	1407	373	75	76	75	72	72	-0.047	12.96	0.58
30	4.866	4.909	0.16	0.16	1.31	79	1.98	1.15	79	1.2	98	0.048	100	101	5.6	-0.1	616	312	757	344	363	478	1409	372	75	76	75	72	72	-0.045	12.95	0.5
31	5.028	5.073	0.16	0.16	1.32	79	1.98	1.14	80	1.2	99	0.048	99	100	5.5	-0.1	623	311	764	344	363	481	1426	373	75	76	75	72	72	-0.047	13.07	0.79
32	5.191	5.236	0.16	0.16	1.32	79	1.98	1.15	80	1.2	99	0.048	100	100	5.3	-0.2	628	310	770	343	362	483	1439	374	75	76	75	72	72	-0.046	13.23	0.95
33	5.353	5.400	0.16	0.16	1.32	79	1.98	1.15	80	1.2	99	0.048	99	100	5.2	-0.1	631	309	774	343	362	484	1437	372	75	76	75	72	72	-0.046	13.17	1.08
34	5.515	5.564	0.16	0.16	1.32	80	1.99	1.15	80	1.2	99	0.048	99	100	5.1	-0.1	634	308	778	342	362	485	1436	369	75	76	75	72	72	-0.046	13.29	0.97
35	5.678	5.729	0.16	0.17	1.32	80	1.98	1.15	80	1.2	99	0.048	99	101	5.0	-0.1	636	307	783	342	362	486	1436	370	75	76	75	72	73	-0.046	13.18	0.78
36	5.840	5.893	0.16	0.16	1.33	80	1.98	1.15	80	1.2	99	0.048	99	100	4.9	-0.1	636	306	787	342	362	487	1438	369	75	76	75	72	72	-0.045	13.38	0.69

Wood Heater Test Data - ASTM E2780 / ASTM E2515

Run: 3	Manufacturer: Hearth & Home	Intrepid IV Catalytic - KJM 2/12/18
	Model: Intrepid IV Catalytic	
Tracking No.: 2264		Total Sampling Time: 177 min
Project No.: 0135WS038E		Recording Interval: 1 min
Test Date: 05-Jan-18		
Beginning Clock Time: 11:39		Background Sample Volume: cubic feet
Meter Box Y Factor: 0.981 (1) 0.984 (2) (Amb)		
Barometric Pressure: Begin Middle End Average		
	30.12 30.12 30.11 30.12 "Hg	
OMNI Equipment Numbers: _____		

PM Control Modules: 2035, 0036 Dilution Tunnel MW(dry): 29.00 lb/lb-mole Dilution Tunnel MW(wet): 28.78 lb/lb-mole Dilution Tunnel H2O: 2.00 percent Dilution Tunnel Static: -0.180 "H2O Tunnel Area: 0.18635 ft ² Pitot Tube Cp: 0.98	Avg. Tunnel Velocity: 13.23 ft/sec Initial Tunnel Flow: 144.2 scfm Average Tunnel Flow: 146.7 scfm Post-Test Leak Check (1): 0.000 cfm @ 5 in. Hg Post-Test Leak Check (2): 0.000 cfm @ 7 in. Hg Average Test Piece Fuel Moisture: 20.90 Dry Basis %
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Technician Signature: B. J. ...

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.026	0.040	0.042	0.044	0.036	0.028	0.048	0.036	0.048
Temp	96	96	96	96	96	96	96	95	96
V_{straw}	13.26 ft/sec			V_{scant}			14.85 ft/sec		
			F _p						0.893

Elapsed Time (min)	Particulate Sampling Data												Fuel Weight (lb)		Temperature Data (°F)													Stack Gas Data				
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter 1 Temp (°F)	Meter 1 Vacuum ("Hg)	Orifice dH 2 ("H ₂ O)	Meter 2 Temp (°F)	Meter 2 Vacuum ("Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Avg. Stove Surface	Catalyst Exit	Stack	Filter 1	Dryer Exit 1	Filter 2	Dryer Exit 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
37	6.004	6.057	0.16	0.16	1.32	80	1.99	1.14	80	1.2	98	0.048	100	100	4.8	-0.1	637	305	791	342	362	487	1443	367	75	76	75	72	73	-0.045	13.48	0.77
38	6.167	6.221	0.16	0.16	1.32	80	1.98	1.15	80	1.2	99	0.048	99	100	4.7	-0.1	637	304	794	342	362	488	1445	366	75	76	75	72	72	-0.045	13.53	0.76
39	6.330	6.385	0.16	0.16	1.32	80	1.98	1.15	81	1.2	99	0.048	99	100	4.5	-0.2	634	303	798	342	362	488	1443	364	75	76	75	72	73	-0.045	13.05	0.76
40	6.492	6.549	0.16	0.16	1.32	80	1.98	1.15	81	1.2	99	0.048	99	100	4.4	-0.1	634	303	801	342	362	488	1445	365	75	76	75	72	73	-0.044	13.13	0.83
41	6.655	6.713	0.16	0.16	1.32	80	1.98	1.15	81	1.2	99	0.048	99	100	4.3	-0.1	634	302	805	343	363	489	1449	364	75	76	75	72	73	-0.044	13.3	0.88
42	6.817	6.878	0.16	0.17	1.33	80	1.99	1.15	81	1.2	99	0.048	99	101	4.2	-0.1	632	301	808	343	363	489	1455	365	75	76	75	72	73	-0.045	13.28	0.98
43	6.980	7.042	0.16	0.16	1.32	81	1.98	1.15	81	1.2	99	0.048	99	100	4.1	-0.1	631	300	811	344	364	490	1462	365	75	76	75	72	72	-0.045	13.22	1.03
44	7.144	7.206	0.16	0.16	1.32	81	1.98	1.15	81	1.2	99	0.048	100	100	4.0	-0.1	631	299	814	344	365	491	1468	366	75	76	75	73	73	-0.044	13.44	1.23
45	7.307	7.370	0.16	0.16	1.32	81	1.98	1.15	81	1.2	99	0.048	99	100	3.9	-0.1	633	298	816	344	366	491	1469	365	75	76	75	73	73	-0.044	13.48	1.2
46	7.470	7.534	0.16	0.16	1.32	81	1.98	1.15	81	1.2	99	0.048	99	100	3.8	-0.1	635	298	818	346	367	493	1473	366	75	76	75	73	73	-0.044	13.64	1.32
47	7.632	7.699	0.16	0.17	1.32	81	1.98	1.15	81	1.2	100	0.048	99	101	3.7	-0.1	638	297	821	347	368	494	1475	367	75	76	75	73	73	-0.045	13.72	1.68
48	7.795	7.863	0.16	0.16	1.32	81	1.98	1.15	82	1.2	100	0.048	99	100	3.5	-0.2	645	296	822	348	369	496	1478	368	75	77	75	73	72	-0.044	13.71	1.64
49	7.958	8.028	0.16	0.17	1.33	81	1.98	1.15	82	1.2	99	0.048	99	101	3.4	-0.1	648	296	824	349	370	497	1479	369	75	77	75	73	73	-0.045	13.68	1.51
50	8.121	8.192	0.16	0.16	1.32	81	1.99	1.15	82	1.2	99	0.048	99	100	3.3	-0.1	654	295	826	351	371	499	1484	370	75	77	75	73	73	-0.045	13.59	1.54
51	8.284	8.356	0.16	0.16	1.32	81	1.98	1.15	82	1.2	99	0.048	99	100	3.2	-0.1	661	295	828	352	373	502	1485	370	76	77	75	73	73	-0.045	13.81	1.42
52	8.448	8.521	0.16	0.17	1.32	81	1.98	1.15	82	1.2	99	0.048	100	101	3.1	-0.1	664	294	830	354	374	503	1490	370	76	77	76	73	73	-0.045	13.69	1.28
53	8.611	8.685	0.16	0.16	1.33	82	1.98	1.15	82	1.2	100	0.048	99	100	3.0	-0.1	667	294	832	356	376	505	1493	372	76	77	76	73	73	-0.044	13.59	1.24
54	8.774	8.849	0.16	0.16	1.32	82	1.99	1.15	82	1.2	100	0.048	99	100	2.9	-0.1	670	293	835	358	377	507	1488	370	76	77	76	73	73	-0.045	13.4	1.07
55	8.937	9.014	0.16	0.16	1.32	82	1.99	1.15	82	1.2	99	0.048	99	101	2.8	-0.1	671	292	838	360	378	508	1482	371	76	77	76	73	73	-0.044	13.19	0.96
56	9.100	9.179	0.16	0.17	1.33	82	1.98	1.15	82	1.2	100	0.048	99	101	2.7	-0.1	673	292	841	362	379	509	1473	370	76	77	76	73	73	-0.044	12.61	0.72
57	9.263	9.343	0.16	0.16	1.32	82	1.99	1.15	82	1.2	100	0.048	99	100	2.6	-0.1	673	292	843	364	381	511	1467	370	76	77	76	73	73	-0.044	12.91	0.63
58	9.426	9.507	0.16	0.16	1.33	82	1.98	1.15	83	1.2	100	0.048	99	100	2.5	-0.1	674	291	845	366	382	512	1457	370	76	77	76	73	73	-0.044	12.67	0.48
59	9.590	9.672	0.16	0.17	1.32	82	1.98	1.15	83	1.2	99	0.048	100	100	2.5	0	673	291	845	368	383	512	1444	369	76	77	76	73	73	-0.044	12.56	0.39
60	9.754	9.836	0.16	0.16	1.33	82	1.99	1.15	83	1.2	99	0.048	100	100	2.4	-0.1	672	290	845	370	385	512	1427	369	76	77	76	73	73	-0.043	12.09	0.28
61	9.919	10.001	0.17	0.16	1.34	82	1.95	1.15	83	1.2	100	0.048	100	101	2.3	-0.1	669	290	844	371	386	512	1415	367	76	77	76	73	73	-0.043	11.72	0.21
62	10.083	10.166	0.16	0.17	1.33	82	1.97	1.15	83	1.2	100	0.048	100	101	2.3	0	668	289	843	373	387	512	1391	365	77	77	76	73	73	-0.041	11.22	0.15
63	10.246	10.331	0.16	0.16	1.32	82	1.97	1.15	83	1.2	99	0.048	99	100	2.2	-0.1	665	289	840	375	388	511	1361	364	77	77	76	73	73	-0.043	10.77	0.05
64	10.409	10.495	0.16	0.16	1.32	82	1.98	1.15	83	1.2	100	0.048	99	100	2.1	-0.1	664	289	837	376	389	511	1338	359	77	77	76	73	73	-0.041	10.37	0.04
65	10.573	10.659	0.16	0.16	1.33	82	1.97	1.15	83	1.2	99	0.048	100	100	2.1	0	663	288	833	378	390	510	1317	358	77	77	76	73	73	-0.040	9.89	0.02
66	10.737	10.824	0.16	0.16	1.32	83	1.97	1.15	83	1.2	99	0.048	100	100	2.0	-0.1	663	288	828	379	391	510	1286	356	77	77	76	73	73	-0.041	9.34	0.01
67	10.900	10.988	0.16	0.16	1.33	83	1.97	1.15	83	1.2	99	0.048	99	100	2.0	0	665	287	822	381	391	509	1250	356	77	77	76	73	73	-0.041	8.73	0.02
68	11.064	11.153	0.16	0.17	1.33	83	1.97	1.16	83	1.2	99	0.048	100	100	2.0	0	666	287	815	382	391	508	1214	355	77	77	76	73	73	-0.039	8	0.06
69	11.228	11.318	0.16	0.16	1.33	83	1.98	1.15	83	1.2	99	0.048	100	100	1.9	-0.1	666	287	807	383	392	507	1180	354	77	77	76	73	73	-0.040	7.55	0.09
70	11.392	11.483	0.16	0.17	1.34	83	1.97	1.15	83	1.2	99	0.048	100	100	1.9	0	665	286	799	384	391	505	1151	351	77	77	76	73	73	-0.040	7.51	0.08
71	11.556	11.648	0.16	0.16	1.33	83	1.97	1.15	83	1.2	99	0.048	100	100	1.9	0	661	286	790	385	392	503	1127	349	77	77	76	73	73	-0.039	7.39	0.07
72	11.722	11.812	0.17	0.16	1.36	83	2.01	1.15	84	1.2	98	0.048	101	100	1.8	-0.1	654	286	780	386	392	500	1106	348	77	77	76	73	73	-0.039	7.06	0.08
73	11.888	11.977	0.17	0.17	1.36	83	2.01	1.15	84	1.2	98	0.048	101	100	1.8	0	644	285	771	387	392	496	1088	344	77	77	76	73	73	-0.038	6.93	0.09

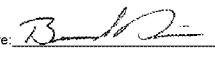
Wood Heater Test Data - ASTM E2780 / ASTM E2515

Run: **3**

Manufacturer: Hearth & Home Intrepid IV Catalytic - KJM 2/12/18
 Model: Intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: 05-Jan-18
 Total Sampling Time: 177 min
 Recording Interval: 1 min
 Beginning Clock Time: 11:39
 Background Sample Volume: _____ cubic feet
 Meter Box Y Factor: 0.981 (1) 0.984 (2) _____ (Amb)
 Barometric Pressure: Begin Middle End Average
30.12 30.12 30.11 30.12 "Hg
 OMNI Equipment Numbers: _____

PM Control Modules: 2035_0036
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Dilution Tunnel H2O: 2.00 percent
 Dilution Tunnel Static: -0.180 "H2O
 Tunnel Area: 0.19635 ft²
 Pitot Tube Cp: 0.98

Avg. Tunnel Velocity: 13.23 ft/sec.
 Initial Tunnel Flow: 144.2 scfm
 Average Tunnel Flow: 146.7 scfm
 Post-Test Leak Check (1): 0.000 cfm @ 5 in. Hg
 Post-Test Leak Check (2): 0.000 cfm @ 7 in. Hg
 Average Test Piece Fuel Moisture: 20.90 Dry Basis %

Technician Signature: 

Velocity Traverse Data											
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center		
Initial dP	0.026	0.040	0.042	0.044	0.036	0.028	0.048	0.036	0.048		
Temp:	96	96	96	96	96	96	96	95	96		
V _{straw}		13.26				V _{scant}		14.85		F _p	0.893
		ft/sec						ft/sec			

Elapsed Time (min)	Particulate Sampling Data													Fuel Weight (lb)		Temperature Data (°F)													Stack Gas Data			
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter 1 Temp (°F)	Meter 1 Vacuum ("Hg)	Orifice dH 2 ("H ₂ O)	Meter 2 Temp (°F)	Meter 2 Vacuum ("Hg)	Dilution Tunnel ("F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Avg. Stove Surface	Catalyst Exit	Stack	Filter 1	Dryer Exit 1	Filter 2	Dryer Exit 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
111	18.215	18.249	0.17	0.16	1.38	84	2.01	1.15	84	1.2	89	0.048	100	99	1.3	0	499	271	523	372	384	410	782	295	74	74	74	71	71	-0.032	4.41	0.52
112	18.382	18.415	0.17	0.17	1.37	83	2.02	1.15	84	1.2	89	0.048	100	100	1.3	0	496	271	519	371	382	408	759	295	74	74	74	71	71	-0.031	4.41	0.53
113	18.548	18.581	0.17	0.17	1.38	83	2.02	1.16	84	1.2	89	0.048	100	100	1.2	-0.1	495	270	515	370	381	406	756	294	74	74	74	71	71	-0.031	4.41	0.53
114	18.715	18.746	0.17	0.16	1.38	83	2.01	1.15	84	1.2	89	0.048	100	99	1.2	0	494	270	512	370	380	405	750	294	74	73	74	71	72	-0.030	4.37	0.52
115	18.882	18.911	0.17	0.17	1.37	83	2	1.15	84	1.2	89	0.048	100	99	1.2	0	493	269	508	368	379	403	743	293	74	73	74	71	71	-0.031	4.37	0.51
116	19.050	19.078	0.17	0.16	1.37	83	2.01	1.15	84	1.2	89	0.048	101	99	1.2	0	492	269	505	368	378	402	740	292	74	73	74	71	71	-0.031	4.39	0.52
117	19.217	19.241	0.17	0.16	1.37	83	2.01	1.16	84	1.2	88	0.048	100	99	1.2	0	491	268	502	367	378	401	736	290	74	73	74	71	71	-0.031	4.35	0.52
118	19.384	19.407	0.17	0.17	1.36	83	2.01	1.15	84	1.2	88	0.048	100	100	1.2	0	490	268	499	366	376	400	731	289	74	73	73	71	71	-0.031	4.29	0.52
119	19.551	19.572	0.17	0.16	1.37	83	2.01	1.16	84	1.2	88	0.048	100	99	1.2	0	488	267	495	365	375	398	726	288	74	73	73	71	71	-0.030	4.31	0.53
120	19.718	19.738	0.17	0.17	1.37	83	2.01	1.16	84	1.2	88	0.048	100	100	1.1	-0.1	487	267	492	364	374	397	731	288	73	73	73	71	71	-0.031	4.35	0.57
121	19.885	19.903	0.17	0.16	1.38	83	2	1.16	84	1.2	88	0.048	100	99	1.1	0	485	266	489	363	373	395	735	289	73	73	73	70	71	-0.030	4.39	0.59
122	20.051	20.069	0.17	0.17	1.38	83	2.01	1.15	84	1.2	88	0.048	100	100	1.1	0	483	265	486	362	372	394	733	287	73	73	73	70	71	-0.030	4.3	0.58
123	20.219	20.234	0.17	0.17	1.37	83	2.01	1.16	84	1.2	88	0.048	101	99	1.1	0	482	265	484	361	371	393	729	285	73	73	73	70	71	-0.030	4.15	0.57
124	20.386	20.399	0.17	0.16	1.38	83	2.01	1.15	84	1.2	87	0.048	100	99	1.1	0	480	264	481	361	370	391	727	285	73	73	73	70	70	-0.031	4.18	0.59
125	20.553	20.565	0.17	0.17	1.38	83	2.01	1.15	83	1.2	87	0.048	100	100	1.1	0	478	264	479	360	369	390	723	284	73	72	73	70	71	-0.030	4.13	0.59
126	20.719	20.729	0.17	0.16	1.37	83	2	1.16	83	1.2	87	0.048	100	99	1.1	0	474	263	476	359	368	388	730	284	73	72	73	70	71	-0.029	5.31	0.55
127	20.886	20.895	0.17	0.17	1.38	83	2.01	1.16	83	1.2	87	0.048	100	100	1.0	-0.1	471	263	474	358	367	387	734	282	73	72	73	70	71	-0.028	5.94	0.55
128	21.053	21.060	0.17	0.16	1.38	83	2.01	1.15	83	1.2	87	0.048	100	99	1.0	0	469	262	472	357	367	385	738	282	73	72	73	70	70	-0.030	5.86	0.55
129	21.220	21.226	0.17	0.17	1.38	83	2.01	1.16	83	1.2	87	0.048	100	100	1.0	0	469	261	470	356	366	384	739	282	73	72	73	70	70	-0.030	5.7	0.58
130	21.387	21.391	0.17	0.16	1.39	83	2.01	1.15	83	1.2	87	0.048	100	99	1.0	0	470	261	469	356	366	384	742	281	73	72	73	70	71	-0.030	5.6	0.62
131	21.553	21.556	0.17	0.17	1.38	83	2.01	1.16	83	1.2	87	0.048	100	99	1.0	0	472	260	467	355	365	384	744	281	73	72	73	70	71	-0.030	5.53	0.62
132	21.721	21.722	0.17	0.17	1.39	83	2.01	1.15	83	1.2	87	0.048	101	100	0.9	-0.1	472	260	465	355	365	383	744	281	73	72	73	70	70	-0.030	5.37	0.62
133	21.888	21.888	0.17	0.17	1.38	83	2.01	1.16	83	1.2	87	0.048	100	100	0.9	0	474	259	464	354	365	383	741	281	73	72	72	70	70	-0.030	5.36	0.61
134	22.055	22.053	0.17	0.16	1.39	83	2.01	1.16	83	1.2	87	0.048	100	99	0.9	0	475	258	463	354	365	383	742	282	73	72	72	69	70	-0.029	5.41	0.63
135	22.222	22.218	0.17	0.16	1.39	83	2.01	1.15	83	1.2	87	0.048	100	99	0.9	0	477	258	462	353	365	383	742	281	72	72	72	69	70	-0.029	5.35	0.63
136	22.389	22.383	0.17	0.16	1.39	83	2.01	1.15	83	1.2	87	0.048	100	99	0.9	0	478	257	461	353	365	383	741	282	72	72	72	69	70	-0.029	5.4	0.65
137	22.556	22.549	0.17	0.17	1.39	83	2.01	1.16	83	1.2	86	0.048	100	100	0.8	-0.1	479	256	460	353	365	383	739	281	72	72	72	69	70	-0.030	5.48	0.66
138	22.723	22.714	0.17	0.16	1.39	83	2.01	1.16	83	1.2	87	0.048	100	99	0.8	0	480	256	458	352	365	382	737	280	72	71	72	69	70	-0.029	5.44	0.62
139	22.890	22.880	0.17	0.17	1.38	82	2	1.15	83	1.2	86	0.048	100	100	0.8	0	480	255	457	352	365	382	738	280	72	71	72	69	70	-0.030	5.38	0.66
140	23.057	23.045	0.17	0.17	1.38	82	2.01	1.16	83	1.2	86	0.048	100	99	0.8	0	482	255	456	352	366	382	738	280	72	71	72	69	70	-0.029	5.34	0.66
141	23.224	23.211	0.17	0.17	1.38	82	2.01	1.16	83	1.2	86	0.048	100	100	0.8	0	483	254	455	352	365	382	730	279	72	71	72	69	70	-0.030	5.23	0.62
142	23.391	23.376	0.17	0.17	1.38	82	2.01	1.16	83	1.2	86	0.048	100	99	0.8	0	484	253	454	351	366	382	728	280	72	71	72	69	70	-0.028	5.22	0.64
143	23.559	23.542	0.17	0.17	1.38	82	2.01	1.16	83	1.2	86	0.048	101	100	0.7	-0.1	486	253	453	351	366	382	725	278	72	71	72	69	70	-0.029	5.11	0.64
144	23.726	23.707	0.17	0.16	1.37	82	2.01	1.15	83	1.2	86	0.048	100	99	0.7	0	486	252	452	351	366	381	726	279	72	71	72	69	70	-0.029	5.09	0.69
145	23.893	23.872	0.17	0.16	1.37	82	2.01	1.15	83	1.2	86	0.048	100	99	0.7	0	488	252	451	351	367	382	722	278	72	71	72	69	70	-0.028	5.05	0.65
146	24.060	24.037	0.17	0.16	1.38	82	2	1.16	82	1.2	86	0.048	100	99	0.7	0	487	251	449	351	367	381	721	277	72	71	72	69	70	-0.029	4.98	0.67
147	24.227	24.203	0.17	0.17	1.38	82	2.01	1.16	82	1.2	86	0.048	100	100	0.7	0	487	251	448	351	367	381	716	276	72	71	72	69	70	-0.028	4.98	0.65

Wood Heater Test Data - ASTM E2780 / ASTM E2515

Run: 3
 Manufacturer: Hearth & Home Intrepid IV Catalytic - KJM 2/12/18
 Model: Intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: 05-Jan-18
 Total Sampling Time: 177 min
 Recording Interval: 1 min
 Background Sample Volume: _____ cubic feet
 Beginning Clock Time: 11:39
 Meter Box Y Factor: 0.981 (1) 0.984 (2) _____ (Amb)
 Barometric Pressure: Begin Middle End Average
30.12 30.12 30.11 30.12 "Hg
 OMNI Equipment Numbers: _____

PM Control Modules: 0035, 0036
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Dilution Tunnel H2O: 2.00 percent
 Dilution Tunnel Static: -0.180 "H2O
 Tunnel Area: 0.18635 ft²
 Pitot Tube Cp: 0.98
 Avg. Tunnel Velocity: 13.23 ft/sec.
 Initial Tunnel Flow: 144.2 scfm
 Average Tunnel Flow: 146.7 scfm
 Post-Test Leak Check (1): 0.000 cfm @ 5 in. Hg
 Post-Test Leak Check (2): 0.000 cfm @ 7 in. Hg
 Average Test Piece Fuel Moisture: 20.90 Dry Basis %

Technician Signature: B. [Signature]

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.026	0.040	0.042	0.044	0.036	0.028	0.048	0.036	0.048
Temp	96	96	96	96	96	96	96	95	96
V _{straw}	<u>13.26</u> ft/sec				V _{scant} <u>14.85</u> ft/sec				F _p <u>0.893</u>

Elapsed Time (min)	Particulate Sampling Data												Fuel Weight (lb)		Temperature Data (°F)													Stack Gas Data				
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter 1 Temp (°F)	Meter 1 Vacuum ("Hg)	Orifice dH 2 ("H ₂ O)	Meter 2 Temp (°F)	Meter 2 Vacuum ("Hg)	Dilution Tunnel ("F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Avg. Stove Surface	Catalyst Exit	Stack	Filter 1	Dryer Exit 1	Filter 2	Dryer Exit 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
148	24.394	24.368	0.17	0.16	1.38	82	2	1.16	82	1.2	86	0.048	100	99	0.6	-0.1	487	251	447	351	368	381	721	277	72	71	72	69	70	-0.028	5.01	0.7
149	24.561	24.533	0.17	0.17	1.38	82	2.01	1.16	82	1.2	86	0.048	100	99	0.6	0	487	250	446	350	367	380	722	277	72	71	72	69	70	-0.028	4.98	0.72
150	24.729	24.699	0.17	0.17	1.39	82	2.01	1.16	82	1.2	86	0.048	101	100	0.6	0	485	249	445	350	368	379	718	275	72	71	72	69	70	-0.028	4.96	0.66
151	24.896	24.864	0.17	0.16	1.38	82	2.01	1.16	82	1.2	86	0.048	100	99	0.6	0	483	249	443	350	368	379	712	273	72	71	72	68	69	-0.028	4.96	0.62
152	25.063	25.030	0.17	0.17	1.38	82	2	1.15	82	1.2	86	0.048	100	100	0.6	0	481	248	442	350	368	378	709	274	72	71	72	68	70	-0.028	4.96	0.62
153	25.229	25.195	0.17	0.16	1.39	82	2.01	1.15	82	1.2	86	0.048	100	99	0.6	0	479	248	441	350	368	377	708	272	72	71	72	68	69	-0.029	4.92	0.62
154	25.396	25.360	0.17	0.16	1.38	82	2.01	1.15	82	1.2	86	0.048	100	99	0.6	0	478	248	440	349	368	377	705	275	72	71	72	68	70	-0.027	4.87	0.63
155	25.563	25.525	0.17	0.16	1.39	82	2.01	1.15	82	1.2	86	0.048	100	99	0.5	-0.1	477	247	439	349	368	376	702	273	72	71	72	68	70	-0.028	4.8	0.63
156	25.730	25.691	0.17	0.17	1.39	82	2	1.16	82	1.2	86	0.048	100	100	0.5	0	475	247	438	349	368	375	704	273	72	70	71	68	70	-0.027	4.81	0.65
157	25.897	25.856	0.17	0.17	1.38	82	2.01	1.16	82	1.2	85	0.048	100	99	0.5	0	473	247	437	348	367	374	701	272	72	70	72	68	70	-0.028	5.73	0.55
158	26.064	26.021	0.17	0.16	1.38	82	2	1.15	82	1.2	85	0.048	100	99	0.5	0	473	246	436	348	368	374	699	271	71	70	71	68	69	-0.028	5.51	0.53
159	26.231	26.186	0.17	0.16	1.38	82	2	1.15	82	1.2	85	0.048	100	99	0.5	0	473	246	435	348	367	374	695	271	71	70	71	68	69	-0.027	5.38	0.53
160	26.398	26.352	0.17	0.17	1.38	82	2	1.15	82	1.2	85	0.048	100	100	0.4	-0.1	473	245	434	347	367	373	692	270	71	70	71	68	70	-0.028	5.29	0.51
161	26.565	26.517	0.17	0.16	1.38	82	2	1.15	82	1.2	85	0.048	100	99	0.4	0	472	245	433	347	366	373	691	269	71	70	71	68	69	-0.028	5.2	0.5
162	26.732	26.682	0.17	0.16	1.39	82	2.01	1.16	82	1.2	85	0.048	100	99	0.4	0	472	245	432	347	366	372	691	268	71	70	71	68	69	-0.028	5.12	0.5
163	26.899	26.848	0.17	0.17	1.39	82	2.01	1.15	82	1.2	85	0.048	100	100	0.4	0	472	245	431	346	366	372	690	269	71	70	71	68	70	-0.028	5.07	0.5
164	27.066	27.012	0.17	0.16	1.39	82	2.01	1.15	82	1.2	85	0.048	100	99	0.4	0	471	244	431	346	365	371	688	269	71	70	71	68	69	-0.027	5	0.5
165	27.233	27.178	0.17	0.17	1.38	82	2	1.16	82	1.2	85	0.048	100	100	0.3	-0.1	471	244	430	346	365	371	687	269	71	70	71	68	70	-0.028	5	0.51
166	27.400	27.343	0.17	0.16	1.38	81	2	1.16	82	1.2	85	0.048	100	99	0.3	0	471	244	429	345	364	371	685	268	71	70	71	68	69	-0.027	4.98	0.51
167	27.567	27.508	0.17	0.16	1.38	81	2.01	1.15	82	1.2	85	0.048	100	99	0.3	0	470	244	429	345	364	370	685	269	71	70	71	68	69	-0.027	4.92	0.52
168	27.734	27.673	0.17	0.16	1.38	81	2.01	1.15	82	1.2	85	0.048	100	99	0.3	0	469	243	427	345	363	369	681	268	71	70	71	68	69	-0.026	4.85	0.51
169	27.902	27.839	0.17	0.17	1.38	81	2.01	1.16	82	1.2	85	0.048	101	100	0.3	0	468	243	427	344	363	369	693	266	71	70	71	68	69	-0.026	6.82	0.41
170	28.069	28.005	0.17	0.17	1.38	81	2	1.15	82	1.2	85	0.048	100	100	0.2	-0.1	469	243	427	345	363	369	701	263	71	70	71	68	70	-0.027	6.7	0.35
171	28.236	28.170	0.17	0.17	1.38	81	2.01	1.16	81	1.2	84	0.048	100	100	0.2	0	471	243	427	344	362	369	707	266	71	70	71	68	70	-0.027	6.64	0.36
172	28.403	28.335	0.17	0.16	1.38	81	2.01	1.15	81	1.2	84	0.048	100	100	0.2	0	474	243	428	344	362	370	712	266	71	70	71	68	69	-0.028	6.47	0.35
173	28.570	28.500	0.17	0.16	1.39	81	2	1.15	81	1.2	85	0.048	100	100	0.2	0	477	243	428	344	362	371	715	267	71	70	71	68	69	-0.028	6.45	0.34
174	28.737	28.665	0.17	0.16	1.37	81	2.01	1.15	81	1.2	84	0.048	100	100	0.1	-0.1	478	243	429	344	361	371	717	267	71	70	71	67	69	-0.028	6.41	0.33
175	28.904	28.830	0.17	0.16	1.38	81	2.01	1.16	81	1.2	84	0.048	100	100	0.1	0	480	243	430	344	361	372	719	268	71	70	71	67	69	-0.027	6.43	0.33
176	29.071	28.995	0.17	0.17	1.38	81	2.01	1.15	81	1.2	84	0.048	100	100	0.1	0	481	243	430	345	362	372	722	269	71	70	71	67	69	-0.027	6.34	0.33
177	29.238	29.160	0.17	0.16	1.38	81	2.01	1.16	81	1.2	84	0.048	100	100	0.0	-0.1	483	243	431	345	362	373	724	269	71	70	71	67	69	-0.027	6.3	0.35

Wood Heater Test Data - ASTM E2780 / ASTM E2515

Run: 3
 Manufacturer: Hearth & Home Intrepid IV Catalytic - KJM 2/12/18
 Model: Intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: 05-Jan-18
 Total Sampling Time: 177 min
 Recording Interval: 1 min
 Beginning Clock Time: 11:39 Background Sample Volume: _____ cubic feet
 Meter Box Y Factor: 0.981 (1) 0.984 (2) _____ (Amb)
 Barometric Pressure: Begin Middle End Average
30.12 30.12 30.11 30.12 "Hg
 OMNI Equipment Numbers: _____

PM Control Modules: 2035, 0036
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Dilution Tunnel H2O: 2.00 percent
 Dilution Tunnel Static: -0.180 "H2O
 Tunnel Area: 0.18635 ft²
 Pitot Tube Cp: 0.98
 Avg. Tunnel Velocity: 13.23 ft/sec.
 Initial Tunnel Flow: 144.2 scfm
 Average Tunnel Flow: 146.7 scfm
 Post-Test Leak Check (1): 0.000 cfm @ 5 in. Hg
 Post-Test Leak Check (2): 0.000 cfm @ 7 in. Hg
 Average Test Piece Fuel Moisture: 20.90 Dry Basis %

Technician Signature: B. [Signature]

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.026	0.040	0.042	0.044	0.036	0.028	0.048	0.036	0.048
Temp:	96	96	96	96	96	96	96	95	96
	V _{straw} <u>13.26</u> ft/sec			V _{scant} <u>14.85</u> ft/sec			F _p <u>0.893</u>		

Elapsed Time (min)	Particulate Sampling Data												Fuel Weight (lb)		Temperature Data (°F)												Stack Gas Data					
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter 1 Temp (°F)	Meter 1 Vacuum ("Hg)	Orifice dH 2 ("H ₂ O)	Meter 2 Temp (°F)	Meter 2 Vacuum ("Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Avg. Stove Surface	Catalyst Exit	Stack	Filter 1	Dryer Exit 1	Filter 2	Dryer Exit 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
Avg/Tot	29.238	29.160	0.17	0.16	1.35	81		1.15	82		93	0.048	100	100								90.6				74	74	71	72	-0.036		

Wood Heater Lab Data - ASTM E2780 / ASTM E2515

Intrepid IV Catalytic - KJM 2/12/18

Manufacturer: Hearth & Home Equipment Numbers: _____
 Model: Intrepid IV Catalytic _____
 Tracking No.: 2264 _____
 Project No.: 0135WS038E _____
 Run #: 3 _____
 Date: 1/5/18 _____

TRAIN 1 (First Hour emissions)

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
B. Front filter catch	Filter	D341	112.3	111.4	0.9
C. Rear filter catch	Filter				0.0
D. Probe catch*	Probe				0.0
E. Filter seals catch*	Seals				0.0

Sub-Total Total Particulate, mg: **0.9**

TRAIN 1 (Post First Hour Change-out)

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
B. Front filter catch	Filter	D342	111.5	111.2	0.3
C. Rear filter catch	Filter	D343	112.1	112.1	0.0
D. Probe catch*	Probe	30	114329.5	114329.6	0.0
E. Filter seals catch*	Seals	R555	3308.1	3308.0	0.1

Sub-Total Total Particulate, mg: **0.4**

Train 1 Aggregate Total Particulate, mg: **1.3**

TRAIN 2

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	D344	112.2	111.5	0.7
B. Rear filter catch	Filter	D345	111.5	111.9	-0.4
C. Probe catch*	Probe	31	114369.1	114369.1	0.0
D. Filter seals catch*	Seals	R556	3303.5	3303.1	0.4

Total Particulate, mg: 0.7

AMBIENT

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch*	Filter				0.0

Total Particulate, mg: 0.0

*Particulate catch that results in a negative number, is assumed to be zero for probes and seals, negative numbers for filters are assumed to be part of the seal weight.

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Technician Signature: 

Wood Heater Test Results - ASTM E2780 / ASTM E2515

Manufacturer: Hearth & Home
 Model: Intrepid IV-Catalytic Intrepid IV Catalytic - KJM 2/12/18
 Project No.: 0135WS038E
 Tracking No.: 2264
 Run: 3
 Test Date: 01/05/18

Burn Rate	1.09 kg/hr dry
Average Tunnel Temperature	93 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	13.23 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8804.9 dscf/hour
Average Delta p	0.048 inches H2O
Total Time of Test	177 minutes

	AMBIENT	SAMPLE TRAIN 1	SAMPLE TRAIN 2	FIRST HOUR FILTER (TRAIN 1)
Total Sample Volume - Vm	0.000 cubic feet	29.238 cubic feet	29.160 cubic feet	9.754 cubic feet
Average Gas Meter Temperature	72 degrees Fahrenheit	81 degrees Fahrenheit	82 degrees Fahrenheit	79 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	0.000 dscf	28.239 dscf	28.214 dscf	9.466 dscf
Total Particulates - m _T	0 mg	1.3 mg	0.7 mg	0.9 mg
Particulate Concentration (dry-standard) - C _p /C _s	0.000000 grams/dscf	0.000005 grams/dscf	0.000002 grams/dscf	0.00010 grams/dscf
Total Particulate Emissions - E _T	0.00 grams	1.20 grams	0.64 grams	0.84 grams
Particulate Emission Rate	0.00 grams/hour	0.41 grams/hour	0.22 grams/hour	0.84 grams/hour
Emissions Factor		0.37 g/kg	0.20 g/kg	0.37 g/kg
Difference from Average Total Particulate Emissions		0.28 grams	0.28 grams	

Dual Train Comparison Results Are Acceptable

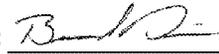
FINAL AVERAGE RESULTS	
Complete Test Run	
Total Particulate Emissions - E _T	0.92 grams
Particulate Emission Rate	0.31 grams/hour
Emissions Factor	0.29 grams/kg
First Hour Emissions	
Total Particulate Emissions - E _T	0.84 grams
Particulate Emission Rate	0.84 grams/hour
Emissions Factor	0.37 grams/kg
7.5% of Average Total Particulate Emissions	0.07 grams

QUALITY CHECKS	
Filter Temps < 90 °F	OK
Filter Face Velocity (47 mm)	OK
Dryer Exit Temp < 80F	OK
Leakage Rate	OK
Ambient Temp (55-90°F)	OK
Negative Probe Weight Eval.	NOT ACCEPTABLE
Pro-Rate Variation	OK
Stove Surface ΔT	OK

Technician Signature: 

Wood Heater Efficiency Results - CSA B415.1

Manufacturer: Hearth & Home
Model: repiod IV Catalytic
Date: 01/05/18
Run: 3
Control #: 0135WS038E
Test Duration: 177
Output Category: II

Technician Signature: 

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	75.0%	81.0%
Combustion Efficiency	95.8%	95.8%
Heat Transfer Efficiency	78%	84.6%

Output Rate (kJ/h)	16,061	15,235	(Btu/h)
Burn Rate (kg/h)	1.08	2.38	(lb/h)
Input (kJ/h)	21,421	20,320	(Btu/h)

Test Load Weight (dry kg)	3.19	7.03	dry lb
MC wet (%)	17.28701406		
MC dry (%)	20.90		
Particulate (g)	0.31		
CO (g)	195		
Test Duration (h)	2.95		

Emissions	Particulate	CO
g/MJ Output	0.01	4.11
g/kg Dry Fuel	0.10	61.03
g/h	0.11	65.99
lb/MM Btu Output	0.02	9.55

Air/Fuel Ratio (A/F)	13.43
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VERSION: 2.2 12/14/2009

ASTM E2515 Lab Sheet

Assembled By:

B Davis

Date/Time in Dessicator:

1/5/18 1510

Weighing #1	Weighing #2	Weighing #3	Weighing #4	Weighing #5
Date/Time: <u>1/9/18 0810</u>	Date/Time: <u>1/9/18 0820</u>	Date/Time:	Date/Time:	Date/Time:
R/H %: <u>8.9</u>	R/H %: <u>6.7</u>	R/H %:	R/H %:	R/H %:
Temp: <u>71.2</u>	Temp: <u>68.9</u>	Temp:	Temp:	Temp:
200 mg Audit: <u>0.2000</u>	200 mg Audit: <u>0.2000</u>	200 mg Audit:	200 mg Audit:	200 mg Audit:
2 g Audit: <u>2.0000</u>	2 g Audit: <u>1.9999</u>	2 g Audit:	2 g Audit:	2 g Audit:
100 g Audit: <u>99.9999</u>	100 g Audit: <u>99.9988</u>	100 g Audit:	100 g Audit:	100 g Audit:
Initials: <u>BL</u>	Initials: <u>BA</u>	Initials:	Initials:	Initials:

Train	Element	ID #	Tare (mg)	Weight (mg)				
A (First Hour)	Front Filter	D341	111.4	112.4	112.3	-		
	Rear Filter		1					
	Probe							
	O-Ring Set							
A (Remainder)	Front Filter	D342	111.2	111.7	111.5	-		
	Rear Filter	D343	112.1	112.1	112.1	-		
	Probe	30	114329.6	114329.5	114329.5	-		
	O-Ring Set	R555	3308.0	3308.1	3308.1	-		
B	Front Filter	D344	111.5	112.4	112.2	-		
	Rear Filter	D345	111.9	111.5	111.5	-		
	Probe	31	114369.1	114369.2	114369.1	-		
	O-Ring Set	R556	3303.1	3303.5	3303.5	-		
BG	Filter							

ASTM E2780 Wood Heater Run Sheets

Client: Hearth & Home Project Number: 0135WS038E Run Number: 3

Model: Intrepid IV Catalytic Tracking Number: 2264 Date: 1/5/18

Test Crew: B Davis
 OMNI Equipment ID numbers: _____

Wood Heater Supplemental Data

Start Time: 11:39 Booth #: E1

Stop Time: 14:36

Stack Gas Leak Check:

Initial: good Final: good

Sample Train Leak Check:

A: 0.0 @ 5 "Hg
 B: 0.0 @ 7 "Hg

Calibrations: Span Gas CO₂: 16.75 CO: 4.20/901

	Pre Test		Post Test	
	Zero	Span	Zero	Span
Time	<u>1112</u>	<u>1112</u>	<u>1440</u>	<u>1440</u>
CO ₂	<u>0.01</u>	<u>16.75</u>	<u>0.01</u>	<u>16.76</u>
CO	<u>0.000/0</u>	<u>4.199/900</u>	<u>0.001/0</u>	<u>4.204/901</u>

Air Velocity (ft/min): Initial: 450 Final: 450

Scale Audit (lbs): Initial: 10.0 Final: 10.0

Pitot Tube Leak Test: Initial: good Final: good

Stack Diameter (in): 6"

Induced Draft: 0.0

% Smoke Capture: 100%

Flue Pipe Cleaned Prior to First Test in Series:

Date: 1/3/18 Initials: AD

	Initial	Middle	Ending
P _b (in/Hg)	<u>30.12</u>	<u>30.12</u>	<u>30.11</u>
RH (%)	<u>20.3</u>	<u>22.7</u>	<u>24.6</u>
Ambient (°F)	<u>73</u>	<u>73</u>	<u>69</u>

Tunnel Traverse		
Microtector Reading	dP (in H ₂ O)	T(°F)
1	<u>.026</u>	<u>96</u>
2	<u>.040</u>	<u>96</u>
3	<u>.042</u>	<u>96</u>
4	<u>.044</u>	<u>96</u>
1	<u>.036</u>	<u>96</u>
2	<u>.028</u>	<u>96</u>
3	<u>.048</u>	<u>96</u>
4	<u>.036</u>	<u>95</u>
Center:		
	<u>.048</u>	<u>96</u>

Background Filter Volume: N/A

Tunnel Static Pressure (in H ₂ O):	
Beginning of Test	End of Test
<u>-.18</u>	<u>-.19</u>

Technician Signature: AD

Date: 1/23/18 73

ASTM E2780 Wood Heater Run Sheets

Project Number: 0135WS038E Run Number: 3

Model: Intrepid IV Catalytic Tracking Number: 2264 Date: 1/5/18

Test Crew: A Davis

OMNI Equipment ID numbers: _____

Wood Heater Fuel Data

Fuel: Douglas fir, untreated and air dried, standard grade or better dimensional lumber

Pre-Burn Fuel					
Calibration:	Cal Value (1) = 12%	Actual Reading	<u>12</u>		
	Cal Value (2) = 22%	Actual Reading	<u>22</u>		
Piece:	Length:	Reading:	Piece:	Length:	Reading:
1	<u>36</u> in	<u>19.9</u>	7	_____ in	_____
2	<u>36</u> in	<u>22.4</u>	8	_____ in	_____
	ft				
3	<u>36</u> in	<u>20.2</u>	9	_____ in	_____
4	_____ in	_____	10	_____ in	_____
5	_____ in	_____	11	_____ in	_____
6	_____ in	_____	12	_____ in	_____
Total Pre-Burn Fuel Weight: <u>13.5</u>			Pre-Burn Fuel Average Moisture: <u>20.83</u>		
Time (clock): <u>08:55</u>		Room Temperature (F): <u>69</u>		Initials: <u>BC</u>	

Test Fuel					
Firebox Volume (ft³): <u>1.31</u>		Test Fuel Piece Length (in): <u>13.5</u>			
Load Weight Range (lb): <u>8.25 - 9.17 - 10.08</u>		Total Wet Fuel Load Weight (lb): <u>8.5</u>			
Fuel Type & Amount: 2 x 4: <u>5</u>			4 x 4: <u>0</u>		
Weight (with spacers): <u>8.5</u>			Weight (with spacers): <u>0</u>		
Piece:	Weight (lbs):	Moisture Readings (%DB):		Fuel Type:	
1	<u>1.4</u>	<u>22.5</u>	<u>22.0</u>	<u>22.2</u>	<u>2x4</u>
2	<u>1.2</u>	<u>19.2</u>	<u>20.3</u>	<u>19.9</u>	<u>2x4</u>
3	<u>1.3</u>	<u>20.3</u>	<u>21.6</u>	<u>22.0</u>	<u>2x4</u>
4	<u>1.2</u>	<u>22.4</u>	<u>21.4</u>	<u>22.6</u>	<u>2x4</u>
5	<u>1.3</u>	<u>19.3</u>	<u>18.6</u>	<u>19.2</u>	<u>2x4</u>
6	_____	_____	_____	_____	_____
7	_____	_____	_____	_____	_____
Spacer Moisture Readings (%DB)					
<u>17.3</u>	<u>16.4</u>	<u>18.2</u>	<u>18.0</u>	<u>13.8</u>	_____
<u>13.9</u>	<u>15.3</u>	<u>15.4</u>	<u>14.9</u>	<u>14.8</u>	_____
<u>20.4</u>	<u>20.5</u>	<u>20.0</u>	<u>15.0</u>	_____	_____
<u>22.8</u>	<u>22.0</u>	<u>22.0</u>	<u>16.2</u>	_____	_____
Technician Signature: <u>1110</u>		Room Temperature (F): <u>70</u>		Date: Initials: <u>BC</u>	
<u>1/5/18</u>				<u>1/23/18</u>	

Client: Hearth & Home Project Number: 0135WS038E Run Number: 3

Model: Intrepid IV Catalytic Tracking Number: 2264 Date: 1/5/18

Test Crew: A. Davis

OMNI Equipment ID numbers: _____

Wood Heater Run Notes

Air Control Settings

Primary:

Secondary: fixed

fully open, pushed fully to the left.

Tertiary/Pilot: N/A

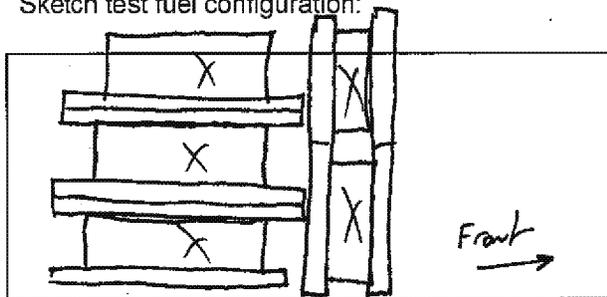
Fan: N/A

Preburn Notes

Time	Notes
10	Raked coals
30	Raked coals
51	Raked coals
70	Raked coals
91	Levelled coal bed

Test Notes

Sketch test fuel configuration:



Start up procedures & Timeline:

Bypass: closed by 55 seconds

Fuel loaded by: 49 seconds

Door closed at: 55 seconds

Primary air: At test setting entire test. Fully open.

Notes: N/A

Time	Notes
60	changed front filter in train A.

Technician Signature: A. Davis

Date: 1/23/18

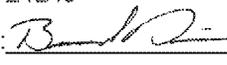
*Model: Intrepid FlexBurn Catalytic
Hearth and Home Technologies
352 Mountain House Road
Halifax, PA 17032*

Run 4

Wood Heater Preburn Data - ASTM E2780

Intrepid IV Catalytic - KJM 2/12/18

Run: 4

Technician Signature: 

Manufacturer: Hearth & Home
 Model: Intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: 1/8/18
 Beginning Clock Time: 10:20

Preburn Fuel Data	
Fuel Piece Lengths (in.):	6
Total Preburn Weight (lb):	13.8
	22.5
Fuel Moisture Readings (% DB):	22.2
	20
	23.2
	20.3
Avg Preburn Moisture (% DB):	21.64

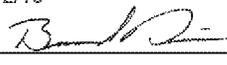
Coal Bed Range (lb):	1.7	2.2
	(min)	(max)

Elapsed Time (min)	Scale (lb)	Stack Draft (in H ₂ O)	Temperatures (°F)							
			FB Top	FB Bottom	FB Back	FB Left	FB Right	Avg. FB	Stack	Ambient
0	10	-0.072	390	157	368	255	234	280.8	797	70
1	9.8	-0.066	402	161	400	260	237	292	532	70
2	9.7	-0.062	401	165	429	266	239	300	451	70
3	9.6	-0.058	397	169	454	272	241	306.6	409	70
4	9.5	-0.055	393	173	476	277	243	312.4	386	70
5	9.4	-0.054	389	178	494	283	244	317.6	373	70
6	9.3	-0.053	387	182	512	288	245	322.8	366	70
7	9.2	-0.053	388	186	527	292	247	328	363	70
8	9.1	-0.053	392	190	542	296	248	333.6	360	70
9	9	-0.052	398	194	555	300	248	339	361	70
10	8.9	-0.052	409	198	566	303	249	345	362	70
11	8.8	-0.052	409	202	572	307	250	348	401	69
12	8.7	-0.053	405	206	587	310	250	351.6	377	70
13	8.6	-0.052	402	209	603	312	251	355.4	371	69
14	8.5	-0.052	401	213	619	315	251	359.8	369	69
15	8.3	-0.052	399	217	635	318	251	364	369	69
16	8.2	-0.052	401	220	649	321	252	368.6	369	69
17	8.1	-0.052	402	223	664	324	252	373	370	69
18	8	-0.051	404	227	677	327	252	377.4	370	69
19	7.9	-0.051	409	230	690	331	252	382.4	372	69
20	7.8	-0.051	414	232	700	335	253	386.8	374	69
21	7.7	-0.051	420	235	710	340	253	391.6	375	69
22	7.6	-0.052	430	238	718	345	254	397	376	69
23	7.5	-0.051	439	240	725	349	254	401.4	376	69
24	7.4	-0.052	448	243	731	355	255	406.4	377	68
25	7.3	-0.053	455	245	735	360	255	410	380	69
26	7.2	-0.05	462	247	739	365	256	413.8	382	69
27	7.2	-0.052	470	249	739	370	257	417	381	69
28	7.1	-0.052	484	251	736	376	257	420.8	381	69
29	7	-0.05	497	253	732	380	259	424.2	379	69
30	6.9	-0.052	517	255	729	385	260	429.2	381	69
31	6.8	-0.051	538	257	726	388	262	434.2	380	69
32	6.7	-0.051	556	259	723	392	264	438.8	381	69
33	6.4	-0.06	558	261	718	396	265	439.6	612	69
34	6.3	-0.057	564	263	720	402	268	443.4	458	69
35	6.1	-0.055	570	265	725	407	270	447.4	419	69
36	6	-0.055	575	267	731	412	273	451.6	405	69
37	5.9	-0.053	580	269	738	416	275	455.6	397	69
38	5.8	-0.053	590	271	743	421	278	460.6	393	69

Wood Heater Preburn Data - ASTM E2780

Intrepid IV Catalytic - KJM 2/12/18

Run: 4

Technician Signature: 

Manufacturer: Hearth & Home
 Model: Intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: 1/8/18
 Beginning Clock Time: 10:20

Preburn Fuel Data	
Fuel Piece Lengths (in.):	6
Total Preburn Weight (lb):	13.8
	22.5
Fuel Moisture Readings (% DB):	22.2
	20
	23.2
	20.3
Avg Preburn Moisture (% DB):	21.64

Coal Bed Range (lb):	1.7 (min)	2.2 (max)
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Elapsed Time (min)	Scale (lb)	Stack Draft (in H ₂ O)	Temperatures (°F)							
			FB Top	FB Bottom	FB Back	FB Left	FB Right	Avg. FB	Stack	Ambient
39	5.7	-0.053	596	273	748	426	280	464.6	392	69
40	5.6	-0.052	603	275	752	430	283	468.6	390	69
41	5.5	-0.053	606	277	756	435	286	472	386	69
42	5.4	-0.052	609	278	759	438	289	474.6	384	69
43	5.3	-0.053	612	280	762	441	292	477.4	387	69
44	5.2	-0.051	614	282	764	445	294	479.8	386	69
45	5.1	-0.051	615	284	766	447	297	481.8	387	69
46	5	-0.052	615	285	768	449	300	483.4	389	69
47	4.9	-0.051	615	287	767	451	303	484.6	390	69
48	4.8	-0.051	619	289	765	452	305	486	388	69
49	4.8	-0.051	620	291	761	454	308	486.8	385	69
50	4.7	-0.05	621	293	756	455	310	487	382	69
51	7.6	-0.117	614	295	742	457	313	484.2	486	69
52	4.3	-0.055	604	296	737	459	316	482.4	453	69
53	4.2	-0.056	623	298	736	459	319	487	405	69
54	4	-0.053	644	299	738	460	323	492.8	393	69
55	3.9	-0.052	663	300	742	460	327	498.4	388	69
56	3.8	-0.051	678	301	748	461	331	503.8	386	69
57	3.7	-0.052	695	302	754	461	335	509.4	384	69
58	3.6	-0.05	706	303	759	462	339	513.8	386	69
59	3.5	-0.051	713	304	763	462	343	517	383	69
60	3.4	-0.051	720	304	770	462	347	520.6	392	70
61	3.3	-0.053	725	305	776	462	351	523.8	398	69
62	3.2	-0.052	728	305	779	462	355	525.8	397	69
63	3.2	-0.05	726	306	776	462	358	525.6	389	70
64	3.1	-0.048	721	306	769	462	363	524.2	382	69
65	3	-0.047	716	306	760	462	367	522.2	374	69
66	3	-0.046	710	307	750	462	370	519.8	369	69
67	2.9	-0.046	703	307	740	462	374	517.2	363	69
68	2.9	-0.045	694	307	729	461	378	513.8	357	69
69	2.8	-0.046	687	307	718	461	382	511	353	70
70	2.8	-0.044	680	307	706	461	386	508	347	69
71	2.7	-0.044	657	308	692	460	389	501.2	394	69
72	2.6	-0.043	638	308	684	459	392	496.2	354	69
73	2.6	-0.043	630	308	677	458	395	493.6	342	69
74	2.6	-0.042	619	308	671	457	396	490.2	337	69
75	2.5	-0.041	608	308	665	457	398	487.2	333	70
76	2.5	-0.042	598	308	659	456	399	484	333	69
77	2.5	-0.041	590	308	655	456	400	481.8	329	69

Wood Heater Preburn Data - ASTM E2780

Run: 4

Intrepid IV Catalytic - KJM 2/12/18

Technician Signature: 

Manufacturer: Hearth & Home
 Model: Intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: 1/8/18
 Beginning Clock Time: 10:20

Preburn Fuel Data	
Fuel Piece Lengths (in.):	<u>6</u>
Total Preburn Weight (lb):	<u>13.8</u>
	<u>22.5</u>
Fuel Moisture Readings (% DB):	<u>22.2</u>
	<u>20</u>
	<u>23.2</u>
	<u>20.3</u>
Avg Preburn Moisture (% DB):	<u>21.64</u>

Coal Bed Range (lb):	<u>1.7</u>	<u>2.2</u>
	(min)	(max)

Elapsed Time (min)	Scale (lb)	Stack Draft (in H ₂ O)	Temperatures (°F)							
			FB Top	FB Bottom	FB Back	FB Left	FB Right	Avg. FB	Stack	Ambient
78	2.4	-0.04	580	308	652	455	401	479.2	325	69
79	2.4	-0.04	573	308	648	455	401	477	325	69
80	2.4	-0.04	569	308	644	454	401	475.2	322	69
81	2.3	-0.039	563	309	642	454	402	474	320	69
82	2.3	-0.039	559	309	638	453	402	472.2	320	69
83	2.3	-0.039	554	309	634	453	401	470.2	317	70
84	2.3	-0.038	551	310	630	453	401	469	316	70
85	2.2	-0.038	548	310	627	452	401	467.6	317	69
86	2.2	-0.038	546	311	624	452	400	466.6	314	70
87	2.2	-0.037	544	311	620	452	400	465.4	314	69
88	2.2	-0.037	542	311	616	452	399	464	313	70
89	2.1	-0.037	541	312	613	451	399	463.2	313	69
90	2.1	-0.037	540	313	609	451	399	462.4	311	68
91	2.1	-0.037	540	313	605	450	398	461.2	312	69

Wood Heater Test Fuel Data - ASTM E2780

Manufacturer: **Hearth & Home** Intrepid IV Catalytic - KJM 2/12/18
 Model: **Intrepid IV Catalytic**
 Tracking No.: **2264**
 Project No.: **0135WS038E**
 Test Date: **1/8/2018**
 Run No.: **4**

Firebox Volume (ft ³):	1.31
Fuel Piece Length (in):	13.5
2x4 Crib Weight (lb):	8.7
4x4 Crib Weight (lb):	0

Total Fuel Weight (Dry Basis, lb):	7.3	
Fuel Density (lb/ft ³ , Dry Basis):	27.79	OK
Loading Density (lb/ft ³ , Wet Basis):	6.64	OK
2x4 Percentage:	N/A	N/A

Coal Bed Range (20-25%): **1.74 - 2.175**

Test Fuel Piece	Weight (lb)	Size	Readings (Dry Basis %)			Dry Weight (lb)
1	1.4	2"x 4"	21.5	22.2	21.9	1.15
2	1.4	2"x 4"	21.0	21.4	22.1	1.15
3	1.4	2"x 4"	21.1	21.9	21.1	1.15
4	1.4	2"x 4"	21.6	21.5	20.5	1.16
5	1.3	2"x 4"	19.3	20.1	18.9	1.09

Spacer Readings (Dry Basis %)			
15.2	12.0		
13.9	12.0		
11.2	12.7		
9.5	12.0		
11.4	9.2		
12.0			
12.7			
9.7			
13.6			
12.9			
12.7			
12.3			
9.4			

Technician Signature:

Wood Heater Test Data - ASTM E2780 / ASTM E2515

Run: 4

Manufacturer: Hearth & Home
 Model: intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: 08-Jan-18

intrepid IV Catalytic - KJM 2/12/18

Total Sampling Time: 173 min
 Recording Interval: 1 min

Beginning Clock Time: 11:52 Background Sample Volume: _____ cubic feet

Meter Box Y Factor: 0.981 (1) 0.984 (2) _____ (Amb)

Barometric Pressure: Begin Middle End Average
29.89 29.82 29.78 29.83 "Hg

OMNI Equipment Numbers: _____

PM Control Modules: 2035, 0036
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Dilution Tunnel H₂O: 2.00 percent
 Dilution Tunnel Static: -0.180 "H₂O
 Tunnel Area: 0.19635 ft²
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 14.04 ft/sec.
 Initial Tunnel Flow: 152.8 scfm
 Average Tunnel Flow: 154.1 scfm
 Post-Test Leak Check (1): 0.000 cfm @ 7 in. Hg
 Post-Test Leak Check (2): 0.000 cfm @ 7 in. Hg
 Average Test Piece Fuel Moisture: 21.07 Dry Basis %

Technician Signature: 

Velocity Traverse Data										
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center	
Initial dP	0.032	0.050	0.052	0.034	0.030	0.050	0.050	0.040	0.050	
Temp:	92	92	91	91	91	91	91	91	91	
V _{straw}	14.00				15.15				F _p	0.924
	ft/sec				ft/sec					

Elapsed Time (min)	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)												Stack Gas Data			
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 (in. H ₂ O)	Meter 1 Temp (°F)	Meter 1 Vacuum (in. Hg)	Orifice dH 2 (in. H ₂ O)	Meter 2 Temp (°F)	Meter 2 Vacuum (in. Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Avg. Stove Surface	Catalyst Exit	Stack	Filter 1	Dryer Exit 1	Filter 2	Dryer Exit 2	Ambient	Draft (in. H ₂ O)	CO ₂ (%)	CO (%)
0	0.000	0.000			0.92	73	1.72	0.63	73	1.1	97	0.050			8.7		537	314	594	450	397	458	934	290	69	71	69	72	69	-0.035	5.91	0.06
1	0.161	0.163	0.16	0.16	1.34	73	1.95	1.15	73	1.1	135	0.050	102	103	8.7	0	519	315	585	451	397	453	901	298	69	73	69	72	69	-0.074	1.48	0.14
2	0.325	0.327	0.16	0.16	1.36	73	1.96	1.15	73	1.1	98	0.050	101	100	8.6	-0.1	495	316	584	449	395	448	1020	280	69	73	69	72	68	-0.036	7.84	0.04
3	0.490	0.492	0.17	0.17	1.38	73	1.99	1.15	73	1.1	91	0.050	101	100	8.5	-0.1	478	317	584	448	394	444	1043	273	69	73	69	72	68	-0.037	7.56	0.04
4	0.657	0.657	0.17	0.17	1.38	73	1.99	1.15	73	1.1	89	0.050	102	100	8.5	0	463	317	585	445	392	440	1060	275	69	73	69	72	67	-0.038	7.38	0.1
5	0.823	0.822	0.17	0.17	1.38	73	1.99	1.15	73	1.1	88	0.050	101	100	8.4	-0.1	456	318	588	444	390	439	1060	281	69	73	69	72	68	-0.039	7.73	0.13
6	0.990	0.986	0.17	0.16	1.39	73	1.99	1.15	73	1.1	88	0.050	102	100	8.3	-0.1	448	318	591	441	387	437	1067	287	68	73	68	72	67	-0.040	7.9	0.12
7	1.156	1.151	0.17	0.17	1.38	73	1.99	1.15	73	1.1	88	0.050	101	100	8.3	0	442	318	595	438	385	436	1074	292	68	73	68	72	68	-0.039	8.18	0.14
8	1.323	1.317	0.17	0.17	1.37	73	2.02	1.14	73	1.1	87	0.050	101	101	8.2	-0.1	437	319	598	435	382	434	1085	296	68	72	68	72	67	-0.041	8.45	0.11
9	1.487	1.481	0.17	0.16	1.37	73	2.01	1.14	73	1.1	88	0.050	100	100	8.1	-0.1	434	319	602	432	378	433	1092	299	69	72	69	72	67	-0.042	8.36	0.11
10	1.652	1.645	0.17	0.16	1.36	73	2	1.14	73	1.1	87	0.050	100	99	8.0	-0.1	430	318	606	429	375	432	1105	302	69	72	69	71	68	-0.042	8.47	0.12
11	1.817	1.809	0.17	0.16	1.36	73	2.01	1.14	73	1.1	89	0.050	100	100	7.9	-0.1	432	319	611	426	372	432	1134	309	69	72	69	71	68	-0.042	9.59	0.13
12	1.982	1.973	0.17	0.16	1.36	73	2	1.14	73	1.1	89	0.050	100	100	7.9	0	443	320	616	424	369	434	1157	315	69	72	69	71	69	-0.042	9.42	0.36
13	2.147	2.137	0.17	0.16	1.36	73	2	1.14	74	1.1	90	0.050	100	100	7.8	-0.1	456	320	621	422	366	437	1164	320	69	72	69	71	68	-0.043	9.32	0.39
14	2.312	2.301	0.17	0.16	1.36	73	2.01	1.14	74	1.1	90	0.050	100	100	7.7	-0.1	467	320	626	421	362	439	1204	326	69	72	69	71	68	-0.044	9.99	0.28
15	2.477	2.465	0.17	0.16	1.36	73	2.01	1.14	74	1.1	90	0.050	100	100	7.6	-0.1	470	320	633	419	359	440	1204	331	69	72	69	71	69	-0.045	9.06	0.44
16	2.642	2.629	0.17	0.16	1.36	73	2.01	1.13	74	1.1	90	0.050	100	100	7.4	-0.2	471	319	637	418	357	440	1177	331	69	71	69	71	68	-0.045	8.92	0.38
17	2.806	2.792	0.16	0.16	1.36	74	2	1.13	74	1.1	90	0.050	100	99	7.3	-0.1	485	319	642	416	354	443	1233	335	70	71	69	71	68	-0.045	10.66	0.34
18	2.971	2.956	0.17	0.16	1.36	74	2.01	1.13	74	1.1	90	0.050	100	100	7.2	-0.1	504	319	647	414	352	447	1287	341	70	71	69	71	68	-0.047	11.11	0.26
19	3.136	3.120	0.17	0.16	1.35	74	2.02	1.13	74	1.2	91	0.050	100	100	7.1	-0.1	513	318	655	412	349	449	1344	346	70	71	69	70	68	-0.049	12.45	0.56
20	3.301	3.284	0.17	0.16	1.35	74	2.01	1.13	74	1.1	91	0.050	100	100	6.9	-0.2	528	318	664	411	347	454	1360	352	70	71	69	70	68	-0.049	12.86	0.51
21	3.465	3.447	0.16	0.16	1.35	74	2.01	1.13	74	1.1	92	0.050	100	99	6.8	-0.1	547	317	673	408	345	458	1384	355	70	71	69	70	69	-0.050	13.07	0.61
22	3.630	3.611	0.17	0.16	1.36	74	2.01	1.13	75	1.2	92	0.050	100	100	6.7	-0.1	561	316	682	407	344	462	1390	359	70	71	70	70	69	-0.049	13.17	0.5
23	3.794	3.774	0.16	0.16	1.35	74	2.01	1.13	75	1.1	92	0.050	100	99	6.6	-0.1	573	315	692	405	343	466	1417	360	70	71	70	70	69	-0.050	13.3	0.62
24	3.959	3.938	0.17	0.16	1.34	74	2.01	1.13	75	1.1	92	0.050	100	100	6.4	-0.2	584	315	702	403	342	469	1428	361	70	71	70	70	69	-0.050	13.21	0.57
25	4.123	4.101	0.16	0.16	1.35	75	2.01	1.13	75	1.2	93	0.050	100	99	6.3	-0.1	594	314	712	401	341	472	1440	365	70	71	70	70	69	-0.050	13.36	0.59
26	4.287	4.265	0.16	0.16	1.35	75	2.01	1.12	75	1.2	93	0.050	100	100	6.2	-0.1	604	313	722	400	340	476	1451	366	70	71	70	70	70	-0.050	13.23	0.67
27	4.452	4.429	0.17	0.16	1.34	75	2.01	1.13	75	1.1	94	0.050	100	100	6.0	-0.2	613	313	731	398	339	479	1457	367	70	71	70	70	70	-0.051	13.42	0.58
28	4.616	4.592	0.16	0.16	1.35	75	2.01	1.12	75	1.1	94	0.050	100	99	5.9	-0.1	618	312	740	396	338	481	1464	370	71	71	70	70	69	-0.050	13.5	0.58
29	4.780	4.755	0.16	0.16	1.36	75	2.01	1.13	76	1.2	95	0.050	100	99	5.8	-0.1	628	311	750	394	338	484	1465	369	71	71	70	70	70	-0.050	13.49	0.66
30	4.945	4.919	0.17	0.16	1.35	75	2.01	1.13	76	1.2	96	0.050	101	100	5.7	-0.1	631	310	758	393	337	486	1461	369	71	71	71	70	70	-0.050	13.56	0.51
31	5.110	5.083	0.17	0.16	1.35	75	2.01	1.12	76	1.2	96	0.050	101	100	5.5	-0.2	632	309	765	391	336	487	1468	370	71	71	71	70	70	-0.050	13.37	0.54
32	5.274	5.247	0.16	0.16	1.35	76	2.01	1.13	76	1.1	95	0.050	100	100	5.4	-0.1	633	308	773	390	336	488	1482	371	71	71	71	70	69	-0.051	13.29	0.63
33	5.439	5.410	0.17	0.16	1.35	76	2	1.12	76	1.1	96	0.050	100	99	5.3	-0.1	634	307	780	389	335	489	1490	373	71	71	71	70	70	-0.050	13.58	0.78
34	5.604	5.574	0.17	0.16	1.35	76	2.01	1.13	76	1.1	96	0.050	100	100	5.2	-0.1	637	306	786	387	335	490	1498	372	71	71	71	70	70	-0.050	13.76	0.94
35	5.769	5.737	0.17	0.16	1.34	76	2.01	1.13	77	1.1	96	0.050	100	99	5.0	-0.2	640	305	792	387	335	492	1504	371	71	71	71	70	70	-0.049	13.82	1.02
36	5.934	5.901	0.17	0.16	1.34	76	2.01	1.13	77	1.2	96	0.050	100	100	4.9	-0.1	642	304	798	386	335	493	1510	369	72	71	71	70	70	-0.050	13.78	1.03

Wood Heater Test Data - ASTM E2780 / ASTM E2515

Run: 4

Manufacturer: Hearth & Home Intrepid IV Catalytic - KJM 2/12/18
 Model: Intrepid IV Catalytic
 Tracking No.: 2264 Total Sampling Time: 173 min
 Project No.: 0135WS038E Recording Interval: 1 min
 Test Date: 08-Jan-18
 Beginning Clock Time: 11:52 Background Sample Volume: _____ cubic feet
 Meter Box Y Factor: 0.981 (1) 0.984 (2) _____ (Amb)
 Barometric Pressure: Begin Middle End Average
29.89 29.82 29.78 29.83 "Hg
 OMNI Equipment Numbers: _____

PM Control Modules: 3035_0036
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Dilution Tunnel H₂O: 2.00 percent
 Dilution Tunnel Static: -0.180 "H₂O
 Tunnel Area: 0.19635 ft²
 Pitot Tube Cp: 0.99
 Avg. Tunnel Velocity: 14.04 ft/sec.
 Initial Tunnel Flow: 152.8 scfm
 Average Tunnel Flow: 154.1 scfm
 Post-Test Leak Check (1): 0.000 cfm @ 7 in. Hg
 Post-Test Leak Check (2): 0.000 cfm @ 7 in. Hg
 Average Test Piece Fuel Moisture: 21.07 Dry Basis %

Technician Signature: [Signature]

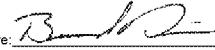
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center	
Initial dP	0.032	0.050	0.052	0.034	0.030	0.050	0.050	0.040	0.050	"H ₂ O
Temp	92	92	91	91	91	91	91	91	91	"F
	$V_{straw} = 14.00$ ft/sec				$V_{scant} = 15.15$ ft/sec				$F_p = 0.924$	

Elapsed Time (min)	Particulate Sampling Data											Fuel Weight (lb)		Temperature Data (°F)												Stack Gas Data						
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 (H ₂ O)	Meter 1 Temp (°F)	Meter 1 Vacuum (Hg)	Orifice dH 2 (H ₂ O)	Meter 2 Temp (°F)	Meter 2 Vacuum (Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Avg. Stove Surface	Catalyst Exit	Stack	Filter 1	Dryer Exit 1	Filter 2	Dryer Exit 2	Ambient	Draft (H ₂ O)	CO ₂ (%)	CO (%)
37	6.098	6.065	0.16	0.16	1.35	76	2.01	1.13	77	1.2	96	0.050	100	100	4.8	-0.1	642	303	803	385	335	494	1512	369	72	71	72	70	70	-0.050	13.92	1.01
38	6.263	6.229	0.17	0.16	1.34	76	2.01	1.12	77	1.2	96	0.050	100	100	4.7	-0.1	639	303	809	384	335	494	1513	370	72	71	72	70	70	-0.049	13.83	0.96
39	6.428	6.392	0.17	0.16	1.34	77	2.01	1.12	77	1.2	97	0.050	100	99	4.6	-0.1	631	302	814	383	335	493	1516	372	72	71	72	70	70	-0.050	13.82	1.04
40	6.593	6.555	0.17	0.16	1.34	77	2.01	1.13	77	1.2	97	0.050	100	99	4.4	-0.2	627	301	819	383	336	493	1516	372	72	71	72	70	70	-0.050	13.55	1.05
41	6.757	6.719	0.16	0.16	1.34	77	2.01	1.12	77	1.2	98	0.050	100	100	4.3	-0.1	626	300	823	383	337	494	1513	372	72	71	72	70	70	-0.049	14.01	1.36
42	6.922	6.884	0.17	0.17	1.34	77	2.01	1.16	78	1.2	98	0.050	100	100	4.2	-0.1	627	299	827	383	337	496	1502	372	72	72	72	70	70	-0.049	13.87	1.82
43	7.087	7.051	0.17	0.17	1.35	77	2.01	1.16	78	1.2	98	0.050	100	101	4.1	-0.1	629	298	829	383	339	496	1501	373	72	72	72	70	71	-0.049	13.84	1.82
44	7.251	7.217	0.16	0.17	1.35	77	2.01	1.17	78	1.2	98	0.050	100	101	3.9	-0.2	632	297	831	383	340	497	1497	373	73	72	72	70	71	-0.049	13.86	1.84
45	7.416	7.384	0.17	0.17	1.35	77	2.02	1.16	78	1.2	98	0.050	100	101	3.8	-0.1	638	296	833	384	342	499	1500	373	73	72	72	70	71	-0.049	13.86	1.74
46	7.581	7.550	0.17	0.17	1.35	78	2.01	1.16	78	1.2	98	0.050	100	101	3.7	-0.1	644	296	835	385	343	501	1492	373	73	72	73	70	71	-0.050	13.78	2
47	7.746	7.716	0.17	0.17	1.35	78	2.01	1.15	78	1.2	98	0.050	100	101	3.6	-0.1	649	295	836	385	345	502	1488	372	73	72	73	70	71	-0.049	13.85	2.03
48	7.911	7.883	0.16	0.17	1.35	78	2.02	1.16	78	1.2	98	0.050	100	101	3.4	-0.2	653	294	837	386	347	503	1485	371	73	72	73	71	71	-0.049	13.74	2.04
49	8.076	8.049	0.17	0.17	1.35	78	2.01	1.15	79	1.2	98	0.050	100	101	3.3	-0.1	659	294	837	387	349	505	1488	371	73	72	73	71	71	-0.049	13.57	1.8
50	8.241	8.215	0.16	0.17	1.35	78	2.01	1.16	79	1.2	99	0.050	100	101	3.2	-0.1	663	293	838	388	351	507	1490	371	73	72	73	71	71	-0.047	13.73	1.67
51	8.406	8.381	0.17	0.17	1.35	78	2.01	1.16	79	1.2	98	0.050	100	101	3.1	-0.1	667	292	839	389	353	508	1484	373	73	72	73	71	71	-0.049	13.82	1.76
52	8.571	8.547	0.16	0.17	1.34	78	2.01	1.16	79	1.2	98	0.050	100	101	3.0	-0.1	671	292	839	390	356	510	1484	371	73	72	73	71	71	-0.048	13.78	1.7
53	8.737	8.714	0.17	0.17	1.35	78	2.01	1.16	79	1.2	98	0.050	101	101	2.9	-0.1	676	291	839	391	358	511	1485	372	73	72	73	71	71	-0.049	13.79	1.66
54	8.902	8.880	0.16	0.17	1.35	79	2.02	1.16	79	1.2	99	0.050	100	101	2.8	-0.1	681	291	840	392	361	513	1484	371	73	72	73	71	71	-0.048	13.71	1.58
55	9.068	9.046	0.17	0.17	1.34	79	2.01	1.16	79	1.2	99	0.050	101	101	2.7	-0.1	687	290	840	394	363	515	1485	372	74	72	73	71	71	-0.049	13.78	1.52
56	9.233	9.213	0.17	0.17	1.33	79	2.01	1.16	79	1.2	99	0.050	100	101	2.6	-0.1	689	290	841	396	365	516	1485	374	74	72	74	71	71	-0.048	13.66	1.39
57	9.398	9.379	0.16	0.17	1.35	79	2.01	1.16	79	1.2	98	0.050	100	101	2.5	-0.1	693	289	841	397	368	518	1482	372	74	72	74	71	71	-0.047	13.64	0.87
58	9.563	9.546	0.17	0.17	1.34	79	2	1.16	80	1.2	99	0.050	100	101	2.4	-0.1	693	289	842	399	370	519	1480	372	74	72	74	71	71	-0.047	13.24	0.41
59	9.728	9.712	0.16	0.17	1.35	79	2.01	1.17	80	1.2	98	0.050	100	100	2.3	-0.1	695	288	843	401	373	520	1434	372	74	72	74	71	71	-0.046	12.93	0.17
60	9.893	9.879	0.17	0.17	1.34	79	2	1.16	80	1.2	98	0.050	100	101	2.2	-0.1	700	288	842	402	375	521	1394	368	74	73	74	71	72	-0.046	12	0.05
61	10.059	10.046	0.17	0.17	1.35	79	2.01	1.16	80	1.2	98	0.050	101	101	2.2	0	706	287	840	404	378	523	1356	367	74	73	74	71	72	-0.045	11.17	0.01
62	10.226	10.212	0.17	0.17	1.41	79	1.86	1.15	80	1.2	99	0.050	101	100	2.1	-0.1	711	287	837	406	379	524	1332	365	74	73	74	71	71	-0.045	10.59	0.02
63	10.393	10.378	0.17	0.17	1.34	80	2.01	1.16	80	1.2	98	0.050	101	100	2.1	0	708	286	833	407	381	523	1299	365	75	73	74	71	72	-0.045	10.12	0.01
64	10.559	10.545	0.17	0.17	1.34	80	2.01	1.15	80	1.2	98	0.050	100	101	2.0	-0.1	704	286	828	408	382	522	1259	363	76	73	74	71	72	-0.044	9.25	0.02
65	10.724	10.711	0.17	0.17	1.34	80	2.01	1.15	80	1.2	98	0.050	100	100	2.0	0	697	285	822	409	384	519	1227	362	76	73	74	71	72	-0.043	8.72	0.03
66	10.890	10.878	0.17	0.17	1.34	80	2	1.16	80	1.2	97	0.050	100	101	1.9	-0.1	688	285	815	411	385	517	1200	359	76	73	74	71	72	-0.044	8.45	0.03
67	11.055	11.044	0.16	0.17	1.34	80	2.01	1.16	81	1.2	98	0.050	100	100	1.9	0	682	285	807	411	386	514	1171	356	76	73	74	72	71	-0.045	7.82	0.04
68	11.221	11.211	0.17	0.17	1.34	80	2.01	1.16	81	1.2	98	0.050	100	101	1.9	0	676	284	798	412	388	512	1145	355	76	73	74	72	72	-0.044	7.39	0.06
69	11.386	11.377	0.16	0.17	1.35	80	2.01	1.16	81	1.2	98	0.050	100	100	1.9	0	668	284	790	413	388	509	1120	353	76	73	74	72	71	-0.042	7.11	0.08
70	11.552	11.544	0.17	0.17	1.35	80	2.01	1.16	81	1.2	98	0.050	100	101	1.8	-0.1	659	284	780	413	389	505	1098	352	76	73	74	72	72	-0.043	7.13	0.08
71	11.717	11.710	0.17	0.17	1.35	80	2.01	1.16	81	1.2	97	0.050	100	100	1.8	0	652	283	771	414	390	502	1078	352	76	73	74	72	71	-0.044	6.9	0.09
72	11.883	11.877	0.17	0.17	1.35	80	2.01	1.16	81	1.2	97	0.050	100	101	1.8	0	644	283	761	414	391	499	1056	352	76	73	74	72	72	-0.042	6.68	0.11
73	12.049	12.044	0.17	0.17	1.35	81	2	1.16	81	1.2	97	0.050	100	101	1.8	0	637	282	751	414	392	495	1038	351	76	73	74	72	72	-0.042	6.58	0.12

Wood Heater Test Data - ASTM E2780 / ASTM E2515

Run: 4
Manufacturer: Hearth & Home **Intrepid IV Catalytic - KJM 2/12/18**
Model: Intrepid IV Catalytic
Tracking No.: 2264
Project No.: 0135WS038E
Test Date: 08-Jan-18
Beginning Clock Time: 11:52
Total Sampling Time: 173 min
Recording Interval: 1 min
Background Sample Volume: _____ cubic feet
Meter Box Y Factor: 0.981 (1) 0.984 (2) _____ (Amb)
Barometric Pressure: Begin Middle End Average
29.89 29.82 29.78 29.83 "Hg
OMNI Equipment Numbers: _____

PM Control Modules: 3035, 0036
Dilution Tunnel MW(dry): 29.00 lb/lb-mole
Dilution Tunnel MW(wet): 28.78 lb/lb-mole
Dilution Tunnel H2O: 2.00 percent
Dilution Tunnel Static: -0.180 "H2O
Tunnel Area: 0.19635 ft²
Pitot Tube Cp: 0.98
Avg. Tunnel Velocity: 14.04 ft/sec.
Initial Tunnel Flow: 152.8 scfm
Average Tunnel Flow: 154.1 scfm
Post-Test Leak Check (1): 0.000 cfm @ 7 in. Hg
Post-Test Leak Check (2): 0.000 cfm @ 7 in. Hg
Average Test Piece Fuel Moisture: 21.07 Dry Basis %

Technician Signature: 

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.032	0.050	0.052	0.034	0.030	0.050	0.050	0.040	0.050
Temp:	92	92	91	91	91	91	91	91	91
V _{straw}	14.00				15.15			F _p 0.924	
	ft/sec				ft/sec				

Elapsed Time (min)	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)															Stack Gas Data		
	Gas Meter 1 (ft³)	Gas Meter 2 (ft³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 (H ₂ O)	Meter 1 Temp (°F)	Meter 1 Vacuum (Hg)	Orifice dH 2 (H ₂ O)	Meter 2 Temp (°F)	Meter 2 Vacuum (Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Avg. Stove Surface	Catalyst Exit	Stack	Filter 1	Dryer Exit 1	Filter 2	Dryer Exit 2	Ambient	Draft (H ₂ O)	CO ₂ (%)	CO (%)		
74	12.215	12.211	0.17	0.17	1.35	81	2.01	1.16	81	1.2	96	0.050	100	101	1.7	-0.1	632	282	741	415	393	493	1021	347	75	73	74	72	71	-0.041	6.47	0.12		
75	12.381	12.377	0.17	0.17	1.35	81	2.01	1.16	81	1.2	96	0.050	100	100	1.7	0	627	282	732	415	394	490	1005	343	75	73	74	72	72	-0.040	6.26	0.14		
76	12.546	12.544	0.16	0.17	1.35	81	2.01	1.16	81	1.2	96	0.050	100	101	1.7	0	621	282	722	415	394	487	990	341	75	73	74	72	72	-0.041	6.19	0.15		
77	12.712	12.711	0.17	0.17	1.35	81	2.01	1.16	81	1.2	96	0.050	100	101	1.7	0	617	281	713	415	395	484	975	340	75	73	74	72	72	-0.040	6.13	0.16		
78	12.878	12.878	0.17	0.17	1.35	81	2	1.16	82	1.2	96	0.050	100	100	1.7	0	612	281	704	415	396	482	962	338	75	73	74	72	72	-0.039	6.04	0.16		
79	13.044	13.045	0.17	0.17	1.35	81	2.01	1.16	82	1.2	96	0.050	100	100	1.6	-0.1	606	281	695	415	397	479	949	336	75	73	74	72	72	-0.040	5.92	0.17		
80	13.210	13.212	0.17	0.17	1.35	81	2.01	1.16	82	1.2	95	0.050	100	100	1.6	0	603	281	686	415	398	477	937	334	75	73	74	72	72	-0.039	5.97	0.18		
81	13.376	13.379	0.17	0.17	1.35	81	2.01	1.16	82	1.2	95	0.050	100	100	1.6	0	599	280	678	415	398	474	926	334	75	73	74	72	72	-0.039	5.95	0.19		
82	13.542	13.546	0.17	0.17	1.35	81	2	1.16	82	1.2	95	0.050	100	100	1.6	0	595	280	670	414	399	472	915	332	75	73	74	72	72	-0.040	5.84	0.19		
83	13.708	13.712	0.17	0.17	1.35	81	2.01	1.16	82	1.2	95	0.050	100	100	1.6	0	591	280	662	414	399	469	906	330	75	73	74	71	72	-0.039	5.82	0.2		
84	13.874	13.879	0.17	0.17	1.35	81	2	1.16	82	1.2	95	0.050	100	100	1.6	0	588	280	655	414	400	467	898	329	75	73	74	71	72	-0.038	5.84	0.21		
85	14.041	14.046	0.17	0.17	1.35	81	2.01	1.16	82	1.2	95	0.050	101	100	1.6	0	586	279	647	414	400	465	890	326	75	72	74	71	72	-0.037	5.75	0.22		
86	14.207	14.213	0.17	0.17	1.35	81	2	1.16	82	1.2	96	0.050	100	100	1.5	-0.1	584	279	641	413	401	464	883	325	75	72	75	71	72	-0.037	5.75	0.22		
87	14.373	14.380	0.17	0.17	1.35	81	2	1.16	82	1.2	95	0.050	100	100	1.5	0	580	279	634	413	401	461	876	324	75	72	75	71	72	-0.038	5.81	0.23		
88	14.539	14.547	0.17	0.17	1.36	82	2	1.15	82	1.2	95	0.050	100	100	1.5	0	576	279	627	412	401	459	869	322	75	72	75	71	72	-0.037	5.68	0.22		
89	14.705	14.714	0.17	0.17	1.35	82	2.01	1.16	82	1.2	95	0.050	100	100	1.5	0	574	278	620	411	402	457	864	321	75	72	74	71	72	-0.037	5.62	0.23		
90	14.871	14.880	0.17	0.17	1.35	82	2	1.16	82	1.2	95	0.050	100	100	1.5	0	573	278	614	411	402	456	859	319	75	72	74	71	72	-0.036	5.58	0.24		
91	15.038	15.047	0.17	0.17	1.35	82	2	1.16	82	1.2	94	0.050	100	100	1.5	0	569	278	609	410	402	454	854	318	75	72	75	71	72	-0.036	5.53	0.27		
92	15.204	15.215	0.17	0.17	1.35	82	2.01	1.16	82	1.2	94	0.050	100	101	1.5	0	566	277	603	409	402	451	848	318	75	72	74	71	72	-0.036	5.49	0.27		
93	15.370	15.382	0.17	0.17	1.35	82	2.01	1.15	82	1.2	94	0.050	100	100	1.4	-0.1	564	277	598	408	402	450	845	317	75	72	74	71	72	-0.036	5.55	0.29		
94	15.536	15.548	0.17	0.17	1.35	82	2.01	1.16	82	1.2	94	0.050	100	100	1.4	0	560	277	593	408	402	448	842	316	75	72	74	71	72	-0.036	5.53	0.3		
95	15.702	15.715	0.17	0.17	1.35	82	2	1.16	82	1.2	94	0.050	100	100	1.4	0	561	276	588	407	402	447	837	313	75	72	74	71	72	-0.036	5.43	0.3		
96	15.869	15.882	0.17	0.17	1.35	82	2.01	1.16	82	1.2	94	0.050	100	100	1.4	0	556	276	583	406	402	445	830	313	75	72	74	71	72	-0.035	5.4	0.31		
97	16.035	16.049	0.17	0.17	1.35	82	2.01	1.16	83	1.2	94	0.050	100	100	1.4	0	553	276	578	405	402	443	825	314	75	72	74	71	72	-0.035	5.42	0.32		
98	16.201	16.216	0.17	0.17	1.35	82	2.01	1.16	83	1.2	94	0.050	100	100	1.4	0	551	275	573	404	402	441	821	311	75	72	75	71	72	-0.036	5.39	0.32		
99	16.368	16.384	0.17	0.17	1.35	82	2	1.16	83	1.2	94	0.050	100	101	1.4	0	549	275	569	403	402	440	818	312	75	72	75	71	72	-0.035	5.46	0.32		
100	16.534	16.551	0.17	0.17	1.35	82	2.01	1.16	83	1.2	94	0.050	100	100	1.3	-0.1	546	275	565	402	402	438	815	310	75	72	74	71	72	-0.034	5.44	0.33		
101	16.700	16.718	0.17	0.17	1.35	82	2.01	1.16	83	1.2	93	0.050	100	100	1.3	0	545	274	560	401	402	436	811	309	75	72	75	71	72	-0.035	5.31	0.35		
102	16.866	16.885	0.17	0.17	1.35	82	2.01	1.16	83	1.2	93	0.050	100	100	1.3	0	543	274	556	400	401	436	808	309	75	72	75	71	72	-0.035	5.28	0.36		
103	17.033	17.052	0.17	0.17	1.35	82	2.01	1.16	83	1.2	93	0.050	100	100	1.3	0	540	274	552	399	401	433	805	306	75	72	74	71	72	-0.034	5.22	0.36		
104	17.199	17.219	0.17	0.17	1.35	82	2.01	1.16	83	1.2	93	0.050	100	100	1.3	0	538	274	549	398	401	432	801	305	75	72	75	71	72	-0.035	5.2	0.37		
105	17.366	17.386	0.17	0.17	1.35	82	2.01	1.16	83	1.2	93	0.050	100	100	1.3	0	536	273	545	397	401	430	799	304	75	72	75	71	72	-0.033	5.23	0.38		
106	17.532	17.554	0.17	0.17	1.35	82	2.01	1.16	83	1.2	93	0.050	100	101	1.3	0	533	273	542	396	400	429	797	304	75	72	74	71	72	-0.033	5.2	0.39		
107	17.698	17.721	0.17	0.17	1.35	82	2.01	1.15	83	1.2	93	0.050	100	100	1.2	-0.1	531	272	538	395	400	427	793	303	75	72	75	71	72	-0.034	5.17	0.38		
108	17.865	17.888	0.17	0.17	1.35	82	2	1.16	83	1.2	93	0.050	100	100	1.2	0	529	272	535	394	400	426	790	303	75	72	75	71	73	-0.034	5.17	0.39		
109	18.031	18.055	0.17	0.17	1.35	82	2	1.16	83	1.2	93	0.050	100	100	1.2	0	527	272	532	392	400	425	787	301	75	72	74	71	72	-0.034	5.12	0.39		
110	18.198	18.223	0.17	0.17	1.35	83	2	1.16	83	1.2	93	0.050	100	101	1.2	0	525	271	529	391	399	423	785	302	75	72	74	71	72	-0.034	5.11	0.41		

Wood Heater Test Data - ASTM E2780 / ASTM E2515

Run: 4
 Manufacturer: Hearth & Home Intrepid IV Catalytic - KJM 2/12/18
 Model: Intrepid IV Catalytic
 Tracking No.: 2264
 Project No.: 0135WS038E
 Test Date: 08-Jan-18
 Total Sampling Time: 173 min
 Recording Interval: 1 min
 Beginning Clock Time: 11:52
 Background Sample Volume: _____ cubic feet
 Meter Box Y Factor: 0.981 (1) 0.984 (2) _____ (Amb)
 Barometric Pressure: Begin Middle End Average
29.89 29.82 29.78 29.83 "Hg
 OMNI Equipment Numbers: _____

PM Control Modules: 3035, 0036
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Dilution Tunnel H2O: 2.00 percent
 Dilution Tunnel Static: -0.180 "H2O
 Tunnel Area: 0.19635 ft²
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 14.04 ft/sec.
 Initial Tunnel Flow: 152.8 scfm
 Average Tunnel Flow: 154.1 scfm
 Post-Test Leak Check (1): 0.000 cfm @ 7 in. Hg
 Post-Test Leak Check (2): 0.000 cfm @ 7 in. Hg
 Average Test Piece Fuel Moisture: 21.07 Dry Basis %

Technician Signature: 

Velocity Traverse Data										
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center	
Initial dP	0.032	0.050	0.052	0.034	0.030	0.050	0.050	0.040	0.050	
Temp:	92	92	91	91	91	91	91	91	91	
V _{straw}	14.00				15.15			F _p 0.924		
ft/sec ft/sec ft/sec										

Elapsed Time (min)	Particulate Sampling Data												Fuel Weight (lb)		Temperature Data (°F)												Stack Gas Data						
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter 1 Temp (°F)	Meter 1 Vacuum ("Hg)	Orifice dH 2 ("H ₂ O)	Meter 2 Temp (°F)	Meter 2 Vacuum ("Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Avg. Stove Surface	Catalyst Exit	Stack	Filter 1	Dryer Exit 1	Filter 2	Dryer Exit 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)	
148	24.523	24.575	0.17	0.17	1.35	84	2.01	1.16	84	1.2	89	0.050	100	99	0.5	0	493	260	470	368	393	397	754	283	75	71	75	70	72	-0.031	5.48	0.49	
149	24.690	24.743	0.17	0.17	1.36	84	2.01	1.16	84	1.2	89	0.050	100	100	0.5	0	493	259	470	367	393	396	752	283	75	71	75	70	72	-0.031	5.45	0.49	
150	24.857	24.910	0.17	0.17	1.36	84	2.02	1.16	84	1.2	89	0.050	100	99	0.5	0	492	259	468	367	392	396	751	282	75	71	75	70	72	-0.030	5.6	0.48	
151	25.023	25.077	0.17	0.17	1.36	84	2	1.16	84	1.2	89	0.050	99	99	0.5	0	492	259	467	366	391	395	749	279	74	71	75	70	72	-0.030	5.86	0.45	
152	25.190	25.245	0.17	0.17	1.36	84	2.01	1.16	84	1.2	89	0.050	100	100	0.5	0	491	259	467	366	391	395	747	281	74	71	75	70	72	-0.030	5.83	0.45	
153	25.357	25.412	0.17	0.17	1.36	84	2.01	1.15	84	1.2	89	0.050	100	99	0.4	-0.1	491	259	466	365	391	394	745	280	74	71	74	70	72	-0.030	5.77	0.44	
154	25.524	25.579	0.17	0.17	1.36	84	2.01	1.16	84	1.2	89	0.050	100	99	0.4	0	491	259	465	365	390	394	745	279	74	71	74	70	72	-0.030	5.79	0.45	
155	25.690	25.747	0.17	0.17	1.36	84	2.01	1.16	84	1.2	89	0.050	99	100	0.4	0	491	259	464	364	390	394	744	280	74	71	74	70	72	-0.030	5.6	0.46	
156	25.857	25.914	0.17	0.17	1.36	84	2.01	1.16	84	1.2	88	0.050	99	99	0.4	0	491	259	464	364	389	393	745	280	74	71	74	70	72	-0.030	5.72	0.46	
157	26.025	26.081	0.17	0.17	1.36	84	2.01	1.16	84	1.2	89	0.050	100	99	0.4	0	491	259	463	363	389	393	744	279	74	71	74	70	72	-0.031	5.69	0.46	
158	26.191	26.249	0.17	0.17	1.36	84	2.02	1.16	84	1.2	89	0.050	99	100	0.3	-0.1	490	259	462	363	388	392	743	279	74	71	74	70	72	-0.029	5.58	0.46	
159	26.358	26.416	0.17	0.17	1.35	84	2.01	1.16	84	1.2	89	0.050	100	99	0.3	0	490	259	462	362	388	392	743	277	74	71	74	70	72	-0.030	5.42	0.48	
160	26.525	26.584	0.17	0.17	1.36	84	2.01	1.16	84	1.2	88	0.050	99	100	0.3	0	489	259	461	361	388	392	742	278	74	71	74	70	71	-0.030	5.44	0.48	
161	26.692	26.751	0.17	0.17	1.36	84	2	1.16	84	1.2	88	0.050	99	99	0.3	0	488	259	461	361	387	391	742	279	74	71	74	70	72	-0.030	5.51	0.48	
162	26.859	26.918	0.17	0.17	1.35	84	2.01	1.16	84	1.2	88	0.050	99	99	0.3	0	487	259	460	360	387	391	741	277	74	71	74	70	72	-0.031	5.38	0.47	
163	27.026	27.086	0.17	0.17	1.36	84	2.02	1.16	84	1.2	88	0.050	99	100	0.3	0	486	259	459	360	387	390	740	279	74	71	74	70	71	-0.030	5.48	0.48	
164	27.193	27.254	0.17	0.17	1.36	84	2.01	1.16	84	1.2	88	0.050	99	100	0.2	-0.1	486	259	458	359	386	390	740	279	74	71	74	70	71	-0.030	5.42	0.49	
165	27.360	27.421	0.17	0.17	1.35	84	2.01	1.16	84	1.2	88	0.050	99	99	0.2	0	486	259	458	358	386	389	740	280	74	71	74	70	72	-0.030	5.39	0.5	
166	27.527	27.589	0.17	0.17	1.35	84	2.01	1.16	84	1.2	88	0.050	99	100	0.2	0	485	259	457	357	386	389	738	279	74	71	74	70	72	-0.030	5.29	0.5	
167	27.694	27.756	0.17	0.17	1.36	84	2.01	1.16	84	1.2	88	0.050	99	99	0.2	0	484	259	457	357	385	388	734	277	74	71	74	70	71	-0.031	5.25	0.48	
168	27.861	27.924	0.17	0.17	1.36	84	2	1.16	84	1.2	87	0.050	99	100	0.2	0	484	258	456	356	386	388	732	277	74	71	73	70	71	-0.031	5.22	0.48	
169	28.028	28.091	0.17	0.17	1.35	83	2.02	1.16	84	1.2	87	0.050	100	99	0.2	0	482	258	455	355	385	387	730	277	74	71	73	70	71	-0.031	5.07	0.48	
170	28.195	28.259	0.17	0.17	1.36	83	2.01	1.16	84	1.2	87	0.050	100	100	0.1	-0.1	481	258	454	355	385	387	729	278	73	71	73	70	71	-0.031	5.11	0.49	
171	28.362	28.426	0.17	0.17	1.35	83	2.01	1.16	84	1.2	87	0.050	100	99	0.1	0	480	258	454	354	385	386	728	278	73	71	73	70	71	-0.030	5.11	0.51	
172	28.529	28.594	0.17	0.17	1.36	83	2.01	1.16	84	1.2	87	0.050	100	100	0.1	0	478	258	453	353	384	385	727	277	73	70	73	70	71	-0.030	5.06	0.52	
173	28.696	28.761	0.17	0.17	1.35	83	2	1.16	84	1.2	87	0.050	100	99	0.0	-0.1	477	258	453	353	384	385	728	276	73	71	73	70	71	-0.030	5.04	0.52	
Avg/Tot	28.696	28.761	0.17	0.17	1.35	80		1.15	80		93	0.050	100	100																			

Wood Heater Lab Data - ASTM E2780 / ASTM E2515

Intrepid IV Catalytic - KJM 2/12/18

Manufacturer: Hearth & Home Equipment Numbers: _____
 Model: Intrepid IV Catalytic _____
 Tracking No.: 2264 _____
 Project No.: 0135WS038E _____
 Run #: 4 _____
 Date: 1/8/18 _____

TRAIN 1 (First Hour emissions)

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
B. Front filter catch	Filter	D346	111.6	111.4	0.2
C. Rear filter catch	Filter				0.0
D. Probe catch*	Probe				0.0
E. Filter seals catch*	Seals				0.0

Sub-Total Total Particulate, mg: **0.2**

TRAIN 1 (Post First Hour Change-out)

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
B. Front filter catch	Filter	D347	111.3	111.4	-0.1
C. Rear filter catch	Filter	D348	110.8	111.0	-0.2
D. Probe catch*	Probe	21	114392.7	114392.8	0.0
E. Filter seals catch*	Seals	R557	4087.8	4086.8	1.0

Sub-Total Total Particulate, mg: **0.7**

Train 1 Aggregate Total Particulate, mg: **0.9**

TRAIN 2

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	D349	111.8	111.4	0.4
B. Rear filter catch	Filter	D372	111.6	111.9	-0.3
C. Probe catch*	Probe	22	114344.6	114344.7	0.0
D. Filter seals catch*	Seals	R558	3307.8	3306.6	1.2

Total Particulate, mg: 1.3

AMBIENT

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch*	Filter		0.0	0.0	0.0

Total Particulate, mg: 0.0

*Particulate catch that results in a negative number, is assumed to be zero for probes and seals, negative numbers for filters are assumed to be part of the seal weight.

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Technician Signature: 

Wood Heater Test Results - ASTM E2780 / ASTM E2515

Manufacturer: Hearth & Home
 Model: Intrepid IV-Catalytic Intrepid IV Catalytic - KJM 2/12/18
 Project No.: 0135WS038E
 Tracking No.: 2264
 Run: 4
 Test Date: 01/08/18

Burn Rate	1.15 kg/hr dry
Average Tunnel Temperature	93 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	14.04 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	9248.3 dscf/hour
Average Delta p	0.050 inches H2O
Total Time of Test	173 minutes

	AMBIENT	SAMPLE TRAIN 1	SAMPLE TRAIN 2	FIRST HOUR FILTER (TRAIN 1)
Total Sample Volume - Vm	0.000 cubic feet	28.696 cubic feet	28.761 cubic feet	9.893 cubic feet
Average Gas Meter Temperature	71 degrees Fahrenheit	80 degrees Fahrenheit	80 degrees Fahrenheit	76 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	0.000 dscf	27.522 dscf	27.634 dscf	9.568 dscf
Total Particulates - m _T	0 mg	0.9 mg	1.3 mg	0.2 mg
Particulate Concentration (dry-standard) - C _p /C _s	0.000000 grams/dscf	0.000003 grams/dscf	0.000005 grams/dscf	0.000002 grams/dscf
Total Particulate Emissions - E _T	0.00 grams	0.87 grams	1.25 grams	0.19 grams
Particulate Emission Rate	0.00 grams/hour	0.30 grams/hour	0.44 grams/hour	0.19 grams/hour
Emissions Factor		0.26 g/kg	0.38 g/kg	0.08 g/kg
Difference from Average Total Particulate Emissions		0.19 grams	0.19 grams	

Dual Train Comparison Results Are Acceptable

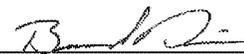
FINAL AVERAGE RESULTS	
Complete Test Run	
Total Particulate Emissions - E _T	1.06 grams
Particulate Emission Rate	0.37 grams/hour
Emissions Factor	0.32 grams/kg
First Hour Emissions	
Total Particulate Emissions - E _T	0.19 grams
Particulate Emission Rate	0.19 grams/hour
Emissions Factor	0.08 grams/kg
7.5% of Average Total Particulate Emissions	0.08 grams

QUALITY CHECKS	
Filter Temps < 90 °F	OK
Filter Face Velocity (47 mm)	OK
Dryer Exit Temp < 80F	OK
Leakage Rate	OK
Ambient Temp (55-90°F)	OK
Negative Probe Weight Eval.	NOT ACCEPTABLE
Pro-Rate Variation	OK
Stove Surface ΔT	OK

Technician Signature:

Wood Heater Efficiency Results - CSA B415.1

Manufacturer: Hearth & Home
Model: repiod IV Catalytic
Date: 01/08/18
Run: 4
Control #: 0135WS038E
Test Duration: 173
Output Category: II

Technician Signature: 

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	74.9%	80.9%
Combustion Efficiency	95.6%	95.6%
Heat Transfer Efficiency	78%	84.6%

Output Rate (kJ/h)	16,767	15,906	(Btu/h)
Burn Rate (kg/h)	1.13	2.49	(lb/h)
Input (kJ/h)	22,400	21,249	(Btu/h)

Test Load Weight (dry kg)	3.26	7.19	dry lb
MC wet (%)	17.40542922		
MC dry (%)	21.07		
Particulate (g)	0.37		
CO (g)	210		
Test Duration (h)	2.88		

Emissions	Particulate	CO
g/MJ Output	0.01	4.35
g/kg Dry Fuel	0.11	64.45
g/h	0.13	72.88
lb/MM Btu Output	0.02	10.10

Air/Fuel Ratio (A/F)	12.94
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VERSION: 2.2 12/14/2009

ASTM E2780 Wood Heater Run Sheets

Client: Hearth & Home Project Number: 0135WS038E Run Number: 4

Model: Intrepid IV Catalytic Tracking Number: 2264 Date: 1/8/18

Test Crew: B Davis

OMNI Equipment ID numbers: _____

ASTM E2515 Lab Sheet

Assembled By:

B Davis

Date/Time in Dessicator:

1/8/18 1520

Weighing #1	Weighing #2	Weighing #3	Weighing #4	Weighing #5
Date/Time: <u>1/9/18 0810</u>	Date/Time: <u>1/10/18 0820</u>	Date/Time: <u>1/11/18 0905</u>	Date/Time:	Date/Time:
R/H %: <u>9.9</u>	R/H %: <u>6.7</u>	R/H %: <u>10.3</u>	R/H %:	R/H %:
Temp: <u>71.2</u>	Temp: <u>68.9</u>	Temp: <u>68.5</u>	Temp:	Temp:
200 mg Audit: <u>0.2000</u>	200 mg Audit: <u>0.2000</u>	200 mg Audit: <u>0.1999</u>	200 mg Audit:	200 mg Audit:
2 g Audit: <u>2.0000</u>	2 g Audit: <u>1.9999</u>	2 g Audit: <u>1.9998</u>	2 g Audit:	2 g Audit:
100 g Audit: <u>99.9979</u>	100 g Audit: <u>99.9980</u>	100 g Audit: <u>99.9981</u>	100 g Audit:	100 g Audit:
Initials: <u>AD</u>	Initials: <u>BL</u>	Initials: <u>BL</u>	Initials:	Initials:

Train	Element	ID #	Tare (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)
A (First Hour)	Front Filter	D346	111.4	111.7	111.6	✓		
	Rear Filter							
	Probe							
	O-Ring Set							
A (Remainder)	Front Filter	D347	111.4	111.3	111.3	✓		
	Rear Filter	D348	111.0	110.8	110.8	✓		
	Probe	21	114392.8	114393.2	114392.8	114392.7	✓	
	O-Ring Set	R557	4086.8 On 4087.0	4087.8	4087.8	✓		
B	Front Filter	D349	111.4	111.8	111.8	✓		
	Rear Filter	D372	111.9	111.6	111.6	✓		
	Probe	22	114344.7	114345.1	114344.7	114344.6	✓	
	O-Ring Set	R558	3306.6	3307.9	3307.8	✓		
BG	Filter							

Technician Signature: B Davis

Date: 1/23/18

ASTM E2780 Wood Heater Run Sheets

Project Number: 0135WS038E Run Number: 4

Model: Intrepid IV Catalytic Tracking Number: 2264 Date: 1/8/18

Test Crew: B Davis
 OMNI Equipment ID numbers: _____

Wood Heater Supplemental Data

Start Time: 11:52 Booth #: E1

Stop Time: 1445

Stack Gas Leak Check:

Initial: good Final: good

Sample Train Leak Check:

A: 0.0 @ 7 "Hg
 B: 0.0 @ 7 "Hg

Calibrations: Span Gas CO₂: 16.74 CO: 4.20/900

	Pre Test		Post Test	
	Zero	Span	Zero	Span
Time	<u>1131</u>	<u>1131</u>	<u>1449</u>	<u>1449</u>
CO ₂	<u>0.00</u>	<u>16.74</u>	<u>0.01</u>	<u>16.67</u>
CO	<u>0.00/0</u>	<u>4.20/900</u>	<u>0.00/0</u>	<u>4.18/893</u>

Air Velocity (ft/min): Initial: 250 Final: 250

Scale Audit (lbs): Initial: 10.0 Final: 10.0

Pitot Tube Leak Test: Initial: 0.0 Final: 0.0

Stack Diameter (in): 6"

Induced Draft: 0.0

% Smoke Capture: 100%

Flue Pipe Cleaned Prior to First Test in Series:

Date: 1/3/18 Initials: OR

	Initial	Middle	Ending
P ₀ (in/Hg)	<u>29.89</u>	<u>29.82</u>	<u>29.78</u>
RH (%)	<u>23.1</u>	<u>21.4</u>	<u>24.4</u>
Ambient (°F)	<u>68</u>	<u>71</u>	<u>71</u>

Tunnel Traverse		
Microtector Reading	dP (in H ₂ O)	T(°F)
1	<u>.032</u>	<u>92</u>
2	<u>.050</u>	<u>92</u>
3	<u>.052</u>	<u>91</u>
4	<u>.034</u>	<u>91</u>
1	<u>.030</u>	<u>91</u>
2	<u>.050</u>	<u>91</u>
3	<u>.050</u>	<u>91</u>
4	<u>.040</u>	<u>91</u>
Center:		
	<u>.050</u>	<u>91</u>

Background Filter Volume: N/A

Tunnel Static Pressure (in H ₂ O):	
Beginning of Test	End of Test
<u>-.18</u>	<u>-.18</u>

Technician Signature: BOR

Date: 1/23/18 90

Model: Intrepid IV Catalytic

Tracking Number: 2264

Date: 1/8/18

Test Crew: B Davis

OMNI Equipment ID numbers: _____

Wood Heater Fuel Data

Fuel: Douglas fir, untreated and air dried, standard grade or better dimensional lumber

Pre-Burn Fuel					
Calibration:		Cal Value (1) = 12%	Actual Reading	<u>12</u>	
		Cal Value (2) = 22%	Actual Reading	<u>22</u>	
Piece:	Length:	Reading:	Piece:	Length:	Reading:
1	<u>28</u> in	<u>22.5</u>	7	_____ in	_____
2	<u>28</u> in	<u>22.2</u>	8	_____ in	_____
	<u>28</u> #in	<u>20.0</u>			
3	<u>28</u> in	<u>23.2</u>	9	_____ in	_____
4	<u>28</u> in	<u>20.3</u>	10	_____ in	_____
5	_____ in	_____	11	_____ in	_____
6	_____ in	_____	12	_____ in	_____
Total Pre-Burn Fuel Weight: <u>13.8</u>		Pre-Burn Fuel Average Moisture: <u>21.6%</u>			
Time (clock): <u>0845</u>		Room Temperature (F): <u>69</u>		Initials: <u>BC</u>	

Test Fuel					
Firebox Volume (ft³): <u>1.31</u>		Test Fuel Piece Length (in): <u>13.5</u>			
Load Weight Range (lb): <u>8.25 - 9.19 - 11.08</u>		Total Wet Fuel Load Weight (lb): <u>8.7</u>			
		<u>1.8 - 2.2</u>			
Fuel Type & Amount: 2 x 4: <u>5</u>		4 x 4: <u>0</u>			
Weight (with spacers): <u>8.7</u>		Weight (with spacers): <u>0</u>			
Piece:	Weight (lbs):	Moisture Readings (%DB):		Fuel Type:	
1	<u>1.4</u>	<u>21.5</u>	<u>22.2</u>	<u>21.9</u>	<u>2x4</u>
2	<u>1.4</u>	<u>21.0</u>	<u>21.4</u>	<u>22.1</u>	<u>2x4</u>
3	<u>1.4</u>	<u>21.1</u>	<u>21.9</u>	<u>21.1</u>	<u>2x4</u>
4	<u>1.4</u>	<u>21.6</u>	<u>21.5</u>	<u>20.5</u>	<u>2x4</u>
5	<u>1.3</u>	<u>19.3</u>	<u>20.1</u>	<u>18.9</u>	<u>2x4</u>
6	_____	_____	_____	_____	_____
7	_____	_____	_____	_____	_____
Spacer Moisture Readings (%DB)					
<u>15.2</u>	<u>11.4</u>	<u>13.6</u>	<u>9.4</u>	<u>12.0</u>	_____
<u>13.9</u>	<u>12.0</u>	<u>12.9</u>	<u>12.0</u>	<u>9.2</u>	_____
<u>11.2</u>	<u>12.7</u>	<u>12.7</u>	<u>12.0</u>	_____	_____
<u>9.5</u>	<u>9.7</u>	<u>12.3</u>	<u>12.7</u>	_____	_____
Technician Signature: <u>11:25</u>		Room Temperature (F): <u>70</u>		Date: Initials: <u>BC</u>	
<u>B Davis</u>				<u>1/23/18</u>	

Model: Intrepid IV Catalytic

Tracking Number: 2264

Date: 1/2/18

Test Crew: B Davis

OMNI Equipment ID numbers: _____

Wood Heater Run Notes

Air Control Settings

Primary:

Secondary:

fixed

Sully open, Push Sully to the left

Tertiary/Pilot:

N/A

Fan:

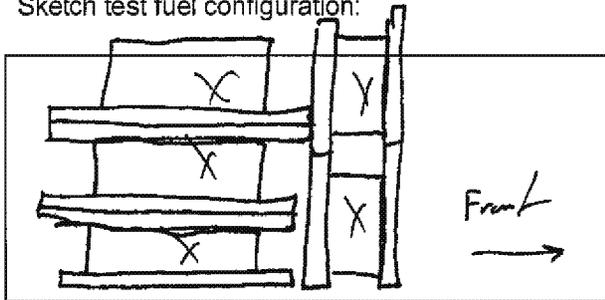
N/A

Preburn Notes

Time	Notes
10	Raked coals
30	Raked coals
50	Raked coals
70	Raked coals
90	Levelled coal bed

Test Notes

Sketch test fuel configuration:



Start up procedures & Timeline:

Bypass:

closed by 55 seconds

Fuel loaded by:

50 seconds

Door closed at:

55 seconds

Primary air:

At first setting the entire test.

Notes:

N/A

Time	Notes
60	changed front filters in train A

Technician Signature: B Davis

Date: 1/23/18

Section 4

Quality Assurance/Quality Control

QUALITY ASSURANCE/QUALITY CONTROL

OMNI follows the guidelines of ISO/IEC 17025, “General Requirements for the Competence of Testing and Calibration Laboratories,” and the quality assurance/quality control (QA/QC) procedures found in OMNI’s Quality Assurance Manual.

OMNI’s scope of accreditation includes, but is not limited to, the following:

- ANSI (American National Standards Institute) for certification of product to safety standards.
- To perform product safety testing by the International Accreditation Service, Inc. (formerly ICBO ES) under accreditation as a testing laboratory designated TL-130.
- To perform product safety testing as a “Certification Organization” by the Standards Council of Canada (SCC).
- Serving as a testing laboratory for the certification of wood heaters by the U.S. Environmental Protection Agency.

This report is issued within the scope of OMNI’s accreditation. Accreditation certificates are available upon request.

The manufacturing facilities and quality control system for the production of the Intrepid FlexBurn at Hearth and Home Technologies were evaluated to determine if sufficient to maintain conformance with OMNI’s requirements for product certification. OMNI has concluded that the manufacturing facilities, processes, and quality control system are adequate to produce the appliance congruous with the standards and model codes to which it was evaluated.

This report shall not be reproduced, except in full, without the written approval of OMNI-Test Laboratories, Inc.

*Model: Intrepid FlexBurn Catalytic
Hearth and Home Technologies
352 Mountain House Road
Halifax, PA 17032*

Sample Analysis

Analysis Worksheets
Tared Filter, Probe, and O-Ring Data

ASTM E2780 Wood Heater Run Sheets

Client: Hearth & Home Project Number: 0135WS038E Run Number: 2

Model: Intrepid IV Catalytic Tracking Number: 2264 Date: 1/3/18

Test Crew: B Davis

OMNI Equipment ID numbers: _____

ASTM E2515 Lab Sheet

Assembled By:

1/3/18 1610 B Davis

Date/Time in Dessicator:

1/3/18 1610

Weighing #1	Weighing #2	Weighing #3	Weighing #4	Weighing #5
Date/Time: <u>1/4/18 0830</u>	Date/Time: <u>1/9/18 0830</u>	Date/Time: <u>1/10/18 0830</u>	Date/Time:	Date/Time:
R/H %: <u>5.2</u>	R/H %: <u>8.9</u>	R/H %: <u>6.7</u>	R/H %:	R/H %:
Temp: <u>72.4</u>	Temp: <u>71.2</u>	Temp: <u>68.9</u>	Temp:	Temp:
200 mg Audit: <u>0.2000</u>	200 mg Audit: <u>0.2000</u>	200 mg Audit:	200 mg Audit:	200 mg Audit:
2 g Audit: <u>1.9998</u>	2 g Audit: <u>2.0000</u>	2 g Audit:	2 g Audit:	2 g Audit:
100 g Audit: <u>99.9978</u>	100 g Audit: <u>99.9978</u>	100 g Audit:	100 g Audit:	100 g Audit:
Initials: <u>BD</u>	Initials: <u>BD</u>	Initials:	Initials:	Initials:

Train	Element	ID #	Tare (mg)	Weight (mg)				
A (First Hour)	Front Filter	D331	111.4	112.0	111.9	✓		
	Rear Filter							
	Probe							
	O-Ring Set							
A (Remainder)	Front Filter	D332	110.7	110.9	110.9	✓		
	Rear Filter	D333	111.8	110.8	110.9	✓		
	Probe	6	115348.8	115349.6	115349.8	✓		
	O-Ring Set	R551	4129.1	4130.6	4130.6	✓		
B	Front Filter	D334	111.9	112.2	112.2	✓		
	Rear Filter	D335	111.7	111.5	111.5	✓		
	Probe	11	114187.0	114187.6	114187.5	✓		
	O-Ring Set	R552	4173.2	4173.8	4173.9	✓		
BG	Filter							

Technician Signature: B Davis

Date: 1/23/18 96

ASTM E2780 Wood Heater Run Sheets

Model: Intrepid IV Catalytic Tracking Number: 2264 Date: 1/4/18

Test Crew: D Davis
 OMNI Equipment ID numbers: _____

ASTM E2515 Lab Sheet

Assembled By:

D Davis

Date/Time in Dessicator:

1/4/16 1645

Weighing #1	Weighing #2	Weighing #3	Weighing #4	Weighing #5
Date/Time: <u>1/9/18 0840</u>	Date/Time: <u>1/9/18 0820</u>			
R/H %: <u>8.9</u>	R/H %: <u>6.7</u>	R/H %:	R/H %:	R/H %:
Temp: <u>71.2</u>	Temp: <u>62.9</u>	Temp:	Temp:	Temp:
200 mg Audit: <u>0.2000</u>	200 mg Audit: <u>0.2000</u>	200 mg Audit:	200 mg Audit:	200 mg Audit:
2 g Audit: <u>2.0000</u>	2 g Audit: <u>1.9999</u>	2 g Audit:	2 g Audit:	2 g Audit:
100 g Audit: <u>99.9977</u>	100 g Audit: <u>99.9800</u>	100 g Audit:	100 g Audit:	100 g Audit:
Initials: <u>DA</u>	Initials: <u>DA</u>	Initials:	Initials:	Initials:

Train	Element	ID #	Tare (mg)	Weight (mg)				
A (First Hour)	Front Filter	D336	111.2	111.8	111.7			
	Rear Filter							
	Probe							
	O-Ring Set							
A (Remainder)	Front Filter	D337	111.6	111.7	111.6			
	Rear Filter	D338	111.3	111.3	111.3			
	Probe	24	114751.7	114751.8	114751.7			
	O-Ring Set	R553	3349.5	3349.9	3349.9			
B	Front Filter	D339	111.9	112.8	112.7			
	Rear Filter	D340	111.7	111.6	111.6			
	Probe	29	114278.7	114278.5	114278.6			
	O-Ring Set	R554	3267.0	3267.4	3267.3			
BG	Filter							

Technician Signature: DA

Date: 1/23/18 97

ASTM E2515 Lab Sheet

Assembled By:

B Davis

Date/Time in Dessicator:

1/5/18 1510

Weighing #1	Weighing #2	Weighing #3	Weighing #4	Weighing #5
Date/Time: <u>1/9/18 0810</u>	Date/Time: <u>1/9/18 0820</u>	Date/Time:	Date/Time:	Date/Time:
R/H %: <u>8.9</u>	R/H %: <u>6.7</u>	R/H %:	R/H %:	R/H %:
Temp: <u>71.2</u>	Temp: <u>68.9</u>	Temp:	Temp:	Temp:
200 mg Audit: <u>0.2000</u>	200 mg Audit: <u>0.2000</u>	200 mg Audit:	200 mg Audit:	200 mg Audit:
2 g Audit: <u>2.0000</u>	2 g Audit: <u>1.9999</u>	2 g Audit:	2 g Audit:	2 g Audit:
100 g Audit: <u>99.9999</u>	100 g Audit: <u>99.9988</u>	100 g Audit:	100 g Audit:	100 g Audit:
Initials: <u>BL</u>	Initials: <u>BA</u>	Initials:	Initials:	Initials:

Train	Element	ID #	Tare (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)
A (First Hour)	Front Filter	<u>D341</u>	<u>111.4</u>	<u>112.4</u>	<u>112.3</u>	-		
	Rear Filter		<u>1</u>					
	Probe							
	O-Ring Set							
A (Remainder)	Front Filter	<u>D342</u>	<u>111.2</u>	<u>111.7</u>	<u>111.5</u>	-		
	Rear Filter	<u>D343</u>	<u>112.1</u>	<u>112.1</u>	<u>112.1</u>	-		
	Probe	<u>30</u>	<u>114329.6</u>	<u>114329.5</u>	<u>114329.5</u>	-		
	O-Ring Set	<u>R555</u>	<u>3308.0</u>	<u>3308.1</u>	<u>3308.1</u>	-		
B	Front Filter	<u>D344</u>	<u>111.5</u>	<u>112.4</u>	<u>112.2</u>	-		
	Rear Filter	<u>D345</u>	<u>111.9</u>	<u>111.5</u>	<u>111.5</u>	-		
	Probe	<u>31</u>	<u>114369.1</u>	<u>114369.2</u>	<u>114369.1</u>	-		
	O-Ring Set	<u>R556</u>	<u>3303.1</u>	<u>3303.5</u>	<u>3303.5</u>	-		
BG	Filter							

ASTM E2780 Wood Heater Run Sheets

Client: Hearth & Home

Project Number: 0135WS038E

Run Number: 4

Model: Intrepid IV Catalytic

Tracking Number: 2264

Date: 1/8/18

Test Crew: B Davis

OMNI Equipment ID numbers: _____

ASTM E2515 Lab Sheet

Assembled By:

B Davis

Date/Time in Dessicator:

1/8/18 1520

Weighing #1	Weighing #2	Weighing #3	Weighing #4	Weighing #5
Date/Time: <u>1/9/18 0810</u>	Date/Time: <u>1/10/18 0820</u>	Date/Time: <u>1/11/18 0905</u>	Date/Time:	Date/Time:
R/H %: <u>9.9</u>	R/H %: <u>6.7</u>	R/H %: <u>10.3</u>	R/H %:	R/H %:
Temp: <u>71.2</u>	Temp: <u>68.9</u>	Temp: <u>68.5</u>	Temp:	Temp:
200 mg Audit: <u>0.2000</u>	200 mg Audit: <u>0.2000</u>	200 mg Audit: <u>0.1999</u>	200 mg Audit:	200 mg Audit:
2 g Audit: <u>2.0000</u>	2 g Audit: <u>1.9999</u>	2 g Audit: <u>1.9998</u>	2 g Audit:	2 g Audit:
100 g Audit: <u>99.9979</u>	100 g Audit: <u>99.9980</u>	100 g Audit: <u>99.9981</u>	100 g Audit:	100 g Audit:
Initials: <u>AD</u>	Initials: <u>BL</u>	Initials: <u>BL</u>	Initials:	Initials:

Train	Element	ID #	Tare (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)
A (First Hour)	Front Filter	D346	111.4	111.7	111.6	✓		
	Rear Filter							
	Probe							
	O-Ring Set							
A (Remainder)	Front Filter	D347	111.4	111.3	111.3	✓		
	Rear Filter	D348	111.0	110.8	110.8	✓		
	Probe	21	114392.8	114393.2	114392.8	114392.7	✓	
	O-Ring Set	R557	4086.8 On 4087.0	4087.8	4087.8	✓		
B	Front Filter	D349	111.4	111.8	111.8	✓		
	Rear Filter	D372	111.9	111.6	111.6	✓		
	Probe	22	114344.7	114345.1	114344.7	114344.6	✓	
	O-Ring Set	R558	3306.6	3307.9	3307.8	✓		
BG	Filter							

Technician Signature: B Davis

Date: 1/23/18

Tare Sheet: (check one) Probes 47mm Filters 100mm Filters O-Ring Pair

Prepared By: B. Davis Balance ID #: OMMJE-00637 Thermohygrometer ID #: OMMJE-00592 Audit Weight ID #: OMMJE-00882A / 100 g

Placed in Dessicator:	Date: <u>12/12/17</u>		Date: <u>12/14/17</u>		Date: <u>12-20-17</u>		Date: <u>1/2-1/18</u>		Project Number	Date Used	Run No.
	Time: <u>3:00</u>	Time: <u>10:04</u>	Time: <u>10:15</u>	Time: <u>0830</u>	RH %: <u>1.4</u>	RH %: <u>8.3</u>	RH %: <u>9.2</u>	RH %: <u>8.9</u>			
Date:	Audit: <u>99997.8</u>										
2	<u>115015.4</u>	<u>115014.5</u>	-	-	-	-	-	-	<u>013565038 E</u>	<u>12/20/17</u>	<u>1</u>
3	<u>114457.7</u>	<u>116008.6</u>	<u>116008.6</u>	-	<u>116008.6</u>	-	-	-	<u>013565038 E</u>	<u>12/21/17</u>	<u>2</u>
OES 3	<u>114768.6</u>	<u>114768.3</u>	-	-	-	-	-	-	<u>013565038 E</u>	<u>12/21/17</u>	<u>3</u>
OES 4	<u>11444.3</u>	<u>11445.0</u>	-	-	<u>114445.2</u>	-	-	-	<u>013565038 E</u>	<u>12/21/17</u>	<u>4</u>
OES 5	<u>114852.9</u>	<u>114857.9</u>	-	-	-	-	-	-	<u>013565038 E</u>	<u>12/21/17</u>	<u>5</u>
OES 6	<u>113573.6</u>	<u>113573.4</u>	-	-	-	-	-	-	<u>013565038 E</u>	<u>12/22/17</u>	<u>6</u>
6	<u>113709.9</u>	<u>115389.7</u>	<u>115389.7</u>	-	<u>115347.6</u>	-	-	<u>115347.8</u>	<u>013565038 E</u>	<u>1/2/18</u>	<u>7</u>
7	<u>115190.7</u>	<u>115387.3</u>	-	-	-	-	-	-	<u>013565038 E</u>	<u>1/2/18</u>	<u>8</u>
8	<u>114981.0</u>	<u>114981.2</u>	-	-	-	-	-	-	<u>013565038 E</u>	<u>1/2/18</u>	<u>9</u>
9	<u>115503.1</u>	<u>115588.1</u>	-	-	-	-	-	-	<u>013565038 E</u>	<u>1/2/18</u>	<u>10</u>
10	<u>115607.2</u>	<u>115692.1</u>	-	-	-	-	-	-	<u>013565038 E</u>	<u>1/2/18</u>	<u>11</u>
11	<u>114444.4</u>	<u>114687.0</u>	-	-	-	-	-	-	<u>013565038 E</u>	<u>1/2/18</u>	<u>12</u>
12	-	-	-	-	-	-	-	-	<u>013565038 E</u>	<u>1/2/18</u>	<u>13</u>
13	-	-	-	-	-	-	-	-	<u>013565038 E</u>	<u>1/2/18</u>	<u>14</u>
14	-	-	-	-	-	-	-	-	<u>013565038 E</u>	<u>1/2/18</u>	<u>15</u>
15	-	-	-	-	-	-	-	-	<u>013565038 E</u>	<u>1/2/18</u>	<u>16</u>
16	-	-	-	-	-	-	-	-	<u>013565038 E</u>	<u>1/2/18</u>	<u>17</u>
17	-	-	-	-	-	-	-	-	<u>013565038 E</u>	<u>1/2/18</u>	<u>18</u>
18	-	-	-	-	-	-	-	-	<u>013565038 E</u>	<u>1/2/18</u>	<u>19</u>
19	-	-	-	-	-	-	-	-	<u>013565038 E</u>	<u>1/2/18</u>	<u>20</u>

Initials: J Initials: GA Initials: GA Initials: GA

Final Technician Signature: [Signature] Date: 1/20/18 Evaluator signature: [Signature] Date: 1/22/2018

Control No. P-SFDP-0002.xls; Effective date: 2/1/2017

Tare Sheet: (check one) Probes 47mm Filters 100mm Filters O-Ring Pair

Prepared By: B. J. Davis Balance ID #: 00001-00637 Thermohygrometer ID #: 00001-00572 Audit Weight ID #: 00001-00283A / 100 g

Placed in Dessicator:	Date: <u>1/3/18</u>					Date: <u>1/5/18</u>					Date: <u>1/6/18</u>					Date Used	Project Number	Run No.
	Date:	Time:	RH %:	T (°F):	Audit:	Date:	Time:	RH %:	T (°F):	Audit:	Date:	Time:	RH %:	T (°F):	Audit:			
ID #																		
21																		
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Final Technician Signature: B. J. Davis Date: 1/10/18
 Initials: BD Initials: BD Initials: BD
 Evaluator signature: [Signature]
 Date: 1/10/18
 Control No. P-SFDP-0002.xls, Effective date: 2/1/2017

Tare Sheet: Probes 47mm Filters / 100mm Filters / O-Ring Pair

Date/time Placed in Dessicator: _____

Thermohyrometer ID #: OMWF-005972

Prepared By: B Davis

Analytical Balance ID #: OMWF-00637

Audit Weight ID #/Mass: OMWR-002834 / 200 mg

ID #	Date: 12/12/17		Date: 12/19/17		Date: 12/18/17		Date Used	Project Number	Run No.	
	Time: 3:00	RH %: 7.4	Time: 10:55	RH %: 8.1	Time: 10:02	RH %: 8.0				Time:
D328	111.8	111.8	111.8	111.8	111.8	111.8	1/2/18	013545038E	5	
D329	112.0	112.1	112.1	112.1	112.1	112.1	1/3/18	013545038E - CAT		
D330	110.8	110.6	110.6	110.6	110.6	110.6				
D331	111.5	111.4	111.4	111.4	111.4	111.4				
D332	110.9	110.7	110.7	110.7	110.7	110.7				
D333	111.5	111.8	111.8	111.8	111.8	111.8				
D334	111.9	111.9	111.9	111.9	111.9	111.9				
D335	111.5	111.7	111.7	111.7	111.7	111.7				
D336	111.0	111.2	111.2	111.2	111.2	111.2	1/4/18	013545038E - CAT	2	
D337	111.4	111.6	111.6	111.6	111.6	111.6				
D338	111.1	111.3	111.3	111.3	111.3	111.3				
D339	111.7	111.7	111.7	111.7	111.7	111.7				
D340	111.5	111.7	111.7	111.7	111.7	111.7				
D341	111.2	111.4	111.4	111.4	111.4	111.4	1/5/18	013545038E - CAT	3	
D342	111.2	111.2	111.2	111.2	111.2	111.2				
D343	112.3	112.1	112.1	112.1	112.1	112.1				
D344	111.7	111.5	111.5	111.5	111.5	111.5				
D345	111.1	111.7	111.7	111.7	111.7	111.7				
D346	111.4	111.4	111.4	111.4	111.4	111.4	1/2/18	013545038E - CAT	7	
D347	111.5	111.4	111.4	111.4	111.4	111.4				
D348	111.1	111.0	111.0	111.0	111.0	111.0				
D349	111.3	111.4	111.4	111.4	111.4	111.4				
Initials: <u>AD</u>		Initials: <u>DA</u>		Initials: <u>DA</u>		Initials: <u>DA</u>		Initials: <u>DA</u>		

Final Technician Signature: [Signature] Date: 4/10/18

Evaluator signature: [Signature] Date: 1/22/2018

Tare Sheet: Probes 47mm Filters 100mm Filters O-Ring Pair

Date/time Placed in Dessicator: 1/4/18 1410

Prepared By: B Davis

Thermohyrometer ID #: OMNIT-00592

Analytical Balance ID #: OMNIT-00637

Audit Weight ID #/Mass: OMNIT-00283A / 200 mg

ID #	Date: <u>1/5/18</u>		Date: <u>1/9/18</u>		Date: <u>1/9/18</u>		Date Used	Project Number	Run No.
	Time: <u>1425</u>	Time: <u>10:20</u>	Time: <u>0820</u>	Time: <u>0820</u>	Time: <u>0820</u>	Time: <u>0820</u>			
	RH %: <u>19.8</u>	RH %: <u>8.6</u>							
	T (°F): <u>71.2</u>	T (°F): <u>74.4</u>	T (°F): <u>77</u>	T (°F): <u>77</u>	T (°F): <u>77</u>	T (°F): <u>77</u>			
	Audit: <u>0.2001</u>	Audit: <u>0.2000</u>							
D372	111.7	111.9					<u>1/8/18</u>	<u>0135M5030E-CAT</u>	<u>4</u>
D373	111.4	111.5					<u>1/11/18</u>	<u>0135M5030E-CAT</u>	
D374	110.5	110.7							
D375	110.0	111.2							
D376	111.7	111.6							
D377	111.1	111.2							
D378	111.6	111.5					<u>1/6/18</u>	<u>0135M5030E-CAT</u>	<u>5</u>
D379	111.3	111.5							
D380	111.5	111.7							
D381	110.9	110.8							
D382	111.2	111.4							
D383	110.2	111.2							
D384	110.8	110.7							
D385	110.0	111.2							
D386	110.3	110.5							
D387	110.0	111.2							
D388	110.6	110.8							
D389	111.1	111.2							
D390	111.2	111.7							
D391	110.4	110.7							
D392	111.2	111.4							
D393	110.7	111.1							

Final Technician Signature: [Signature] Date: 1/10/18

Control No. P-SFDP-0001.xls, Effective date: 9/9/2015

Evaluator signature: [Signature]

Tare Sheet: (check one)

Probes

47mm Filters

100mm Filters

O-Ring Pair

Prepared By: B. Davis Balance ID #: OMWF-00637 Thermohyrometer ID #: OMWF-00592 Audit Weight ID #/Mass: OMWT-0051A / 5 g/m

Placed in Dessicator:	Date: <u>12/12/17</u>		Date: <u>12/14/17</u>		Date: <u>12-20-17</u>		Date Used		Project Number	Run No.
	Time: <u>3:00</u>	Time: <u>10:04</u>	Time: <u>10:15</u>	Time: <u>10:15</u>	Time: <u>10:15</u>	Time: <u>10:15</u>	Time: <u>10:15</u>	Time: <u>10:15</u>		
Date: <u>12/12/17</u>	RH %: <u>6.4</u>	RH %: <u>7.3</u>	RH %: <u>7.3</u>	RH %: <u>7.6</u>	RH %: <u>7.6</u>	RH %: <u>7.6</u>	RH %: <u>7.6</u>	RH %: <u>7.6</u>	RH %: <u>7.6</u>	RH %: <u>7.6</u>
Time: <u>7:32</u>	T (°F): <u>73.2</u>	T (°F): <u>74.8</u>	T (°F): <u>73.6</u>	T (°F): <u>73.6</u>	T (°F): <u>73.6</u>	T (°F): <u>73.6</u>	T (°F): <u>73.6</u>	T (°F): <u>73.6</u>	T (°F): <u>73.6</u>	T (°F): <u>73.6</u>
Audit: <u>7999.9</u>	Audit: <u>5000.0</u>	Audit: <u>5000.0</u>	Audit: <u>5000.0</u>	Audit: <u>5000.0</u>	Audit: <u>5000.0</u>	Audit: <u>5000.0</u>	Audit: <u>5000.0</u>	Audit: <u>5000.0</u>	Audit: <u>5000.0</u>	Audit: <u>5000.0</u>
R541	3541.4	3541.5	3541.5	3541.5	3541.5	3541.5	3541.5	3541.5	013525038E	1
R542	3499.6	3499.6	3499.6	3499.6	3499.6	3499.6	3499.6	3499.6	013525038E	2
R543	3574.4	3574.5	3574.5	3574.5	3574.5	3574.5	3574.5	3574.5	013525038E	3
R544	3521.1	3521.1	3521.1	3521.1	3521.1	3521.1	3521.1	3521.1	013525038E	4
R545	4154.6	4154.6	4154.6	4154.6	4154.6	4154.6	4154.6	4154.6	013525038E	5
R546	3397.1	3397.1	3397.1	3397.1	3397.1	3397.1	3397.1	3397.1	013525038E	6
R547	3397.1	3397.3	3397.3	3397.3	3397.3	3397.3	3397.3	3397.3	013525038E	7
R548	3273.6	3273.6	3273.6	3273.6	3273.6	3273.6	3273.6	3273.6	013525038E	8
R549	3273.6	3273.8	3273.8	3273.8	3273.8	3273.8	3273.8	3273.8	013525038E	9
R550	4129.1	4129.1	4129.1	4129.1	4129.1	4129.1	4129.1	4129.1	013525038E	10
R551	4177.5	4177.5	4177.5	4177.5	4177.5	4177.5	4177.5	4177.5	013525038E - CAT	1
R552	3349.5	3349.5	3349.5	3349.5	3349.5	3349.5	3349.5	3349.5	013525038E - CAT	2
R553	3307.9	3307.9	3307.9	3307.9	3307.9	3307.9	3307.9	3307.9	013525038E - CAT	3
R554	3307.9	3307.9	3307.9	3307.9	3307.9	3307.9	3307.9	3307.9	013525038E - CAT	4
R555	3307.9	3307.9	3307.9	3307.9	3307.9	3307.9	3307.9	3307.9	013525038E - CAT	5
R556	3307.9	3307.9	3307.9	3307.9	3307.9	3307.9	3307.9	3307.9	013525038E - CAT	6
R557	-	-	-	-	-	-	-	-	013525038E - CAT	7
R558	-	-	-	-	-	-	-	-	013525038E - CAT	8
R559	-	-	-	-	-	-	-	-	013525038E - CAT	9
R560	-	-	-	-	-	-	-	-	013525038E - CAT	10

Final Technician Signature: [Signature] Date: 1/16/18
 Control No. P-SFDP-0002.xls, Effective date: 2/1/2017
 Evaluator signature: [Signature] Date: 1/22/2018

Tare Sheet: (check one) Probes 47mm Filters 100mm Filters O-Ring Pair 5mm
 Prepared By: B. Davis Balance ID #: 0mmw-00632 Thermohygrometer ID #: 0mmw-00572 Audit Weight ID #/Mass: 0mmw-00251A / 50g

Placed in Dessicator:	Date: <u>1/4/18</u>		Date: <u>1/5/18</u>		Date: <u>1/8/18</u>		Date Used	Project Number	Run No.
	Time: <u>0840</u>	Time: <u>0920</u>	Time: <u>0810</u>	Time: <u>0810</u>	Time: <u>0810</u>	Time: <u>0810</u>			
Date: _____	RH %: <u>19.6</u>	RH %: <u>20.4</u>	RH %: <u>18.9</u>	RH %: _____	RH %: _____	RH %: _____			
Time: _____	T (°F): <u>73.4</u>	T (°F): <u>71.4</u>	T (°F): <u>70.6</u>	T (°F): _____	T (°F): _____	T (°F): _____			
ID #	Audit: <u>5.0001</u>	Audit: <u>5.0000</u>	Audit: <u>5.0000</u>	Audit: _____	Audit: _____	Audit: _____			
R557	<u>4086.6</u>	<u>4087.0</u>	<u>4087.8</u>	<u>4087.8</u>	<u>4087.8</u>	<u>4087.8</u>	<u>1/8/18</u>	<u>013525038E-cat</u>	<u>4</u>
R558	<u>3366.4</u>	<u>3366.7</u>	<u>3366.6</u>	<u>3366.6</u>	<u>3366.6</u>	<u>3366.6</u>	<u>1/11/18</u>	<u>022618029E</u>	<u>1</u>
R559	<u>4148.1</u>	<u>4148.2</u>	<u>4148.2</u>	<u>4148.2</u>	<u>4148.2</u>	<u>4148.2</u>	<u>1/16/18</u>	<u>013525038E-cat</u>	<u>5</u>
R560	<u>3277.2</u>	<u>3277.6</u>	<u>3277.7</u>	<u>3277.7</u>	<u>3277.7</u>	<u>3277.7</u>			
R561	<u>4102.1</u>	<u>4102.5</u>	<u>4102.3</u>	<u>4102.3</u>	<u>4102.3</u>	<u>4102.3</u>			
R562	<u>3275.0</u>	<u>3275.4</u>	<u>3275.7</u>	<u>3275.7</u>	<u>3275.7</u>	<u>3275.7</u>			
R563	<u>3376.0</u>	<u>3376.2</u>	<u>3376.2</u>	<u>3376.2</u>	<u>3376.2</u>	<u>3376.2</u>			
R564	<u>3395.8</u>	<u>3395.8</u>	<u>3395.8</u>	<u>3395.8</u>	<u>3395.8</u>	<u>3395.8</u>			
R565	<u>4140.6</u>	<u>4140.6</u>	<u>4140.6</u>	<u>4140.6</u>	<u>4140.6</u>	<u>4140.6</u>			
R566	<u>4135.3</u>	<u>4135.6</u>	<u>4135.2</u>	<u>4135.2</u>	<u>4135.2</u>	<u>4135.2</u>			
R567	<u>3295.7</u>	<u>3295.9</u>	<u>3295.9</u>	<u>3295.9</u>	<u>3295.9</u>	<u>3295.9</u>			
R568	<u>3367.0</u>	<u>3367.5</u>	<u>3367.2</u>	<u>3367.2</u>	<u>3367.2</u>	<u>3367.2</u>			
R569	<u>3354.7</u>	<u>3355.2</u>	<u>3354.7</u>	<u>3354.7</u>	<u>3354.7</u>	<u>3354.7</u>			
R570	<u>3307.0</u>	<u>3307.3</u>	<u>3307.3</u>	<u>3307.3</u>	<u>3307.3</u>	<u>3307.3</u>			
R571	<u>3330.3</u>	<u>3330.4</u>	<u>3330.4</u>	<u>3330.4</u>	<u>3330.4</u>	<u>3330.4</u>			
R572	<u>4196.6</u>	<u>4196.7</u>	<u>4196.7</u>	<u>4196.7</u>	<u>4196.7</u>	<u>4196.7</u>			
-									
-									
-									
-									
Initials: <u>BA</u>	Initials: <u>AK</u>	Initials: <u>AK</u>	Initials: <u>AK</u>	Initials: <u>AK</u>	Initials: <u>AK</u>	Initials: <u>AK</u>			

Final Technician Signature: BA Date: 1/10/18
 Control No. P-SFDP-0002.xls, Effective date: 2/1/2017

Evaluator signature: [Signature]

Calibrations

Methods EPA 28R, ASTM E2515, ASTM E2780

ID #	Lab Name/Purpose	Log Name	Attachment Type
1	Calibrator Dry Gas Meter	Rockwell Int'l Standard Test Meter	Calibration Certificate
637	Scale-Analytical Balance	Mettler Analytical Balance	Calibration Certificate
353	Scale	ELEC-weighing Scale MTW-150K	Calibration Log
283A	Audit Weights	21-Piece weight set	Calibration Certificate
132	10 lb Weight	Weight Standard, 10 lb.	Calibration Certificate
185	Platform Scale	Weigh-Tronix Platform Scale	Calibration Certificate
209	Barometer	Barometer – Princo	Manual Cover
296- T58	Tape Measure	Stanley Tape Measure	Calibration Log
335	Sample Box / Dry Gas Meter	Apex Automated Emissions Sampling Box	Calibration Log
336	Sample Box / Dry Gas Meter	Apex Automated Emissions Sampling Box	Calibration Log
340	Wood Moisture Meter	Moisture Meter - Delmhorst	See Test Run Notes
592	Thermohygrometer	Omega Digital Thermohygrometer	Calibration Log
410	Microtector	Dwyer Microtector	Calibration Certificate
594	Combustion Gas Analyzer	Infrared Gas Analyzer	Manual, See Test Run Notes
567	Stopwatch	Robotic Stopwatch SC-606W	Calibration Log
431	Moisture Meter Calibrator	Delmhorst Moisture Content Calibrator	Calibration Log
265	Vaneometer	Dwyer Vaneometer	Manual

CERTIFICATE OF CALIBRATION

CUSTOMER:	OMNI TEST LABS INC. PORTLAND OR	CALIBRATION DATE:	10/30/17
PO NUMBER:	170154	CALIBRATION DUE:	10/30/18
INST. MANUFACTURER:	ROCKWELL	PROCEDURE:	NAVAIR 17-20MG-02
INST. DESCRIPTION:	P.D. METER	CALIBRATION FLUID:	AIR @ 14.7 PSIA 70 F
MODEL NUMBER:	S-275	STANDARD(S) USED:	A4, A24 DUE 04-2020
SERIAL NUMBER:	684390L	NIST TRACE # 'S:	1446135470, 1453298155
RATED UNCERTAINTY:	+/- .5 % RD.	AMBIENT CONDITIONS:	761 mm HGA 48 % RH 72 F
UNCERTAINTY GIVEN:	TOTAL measurement uncertainty: +/- .190 % RD. K=2		
NOTES:	AS RECEIVED/ AS LEFT WITHIN SPECS. REFERENCE CONDITIONS ARE: 760 mm HGA 70 F **OMNI-00001**		

TEST POINT NUMBER	UUT	DM.STD.	CORRECTION FACTOR	K FACTOR
	INDICATED SCFH	ACTUAL SCFH		
1	0.7314	0.73	0.99805	60.117
2	10.0745	10.05	0.99757	60.146
3	53.2919	53.14	0.99715	60.171
4	100.2740	100.02	0.99747	60.152
5	136.1637	135.88	0.99792	60.125
6	176.4641	176.07	0.99777	60.134
7	215.6504	215.14	0.99763	60.142
8	250.4925	250.05	0.99823	60.106
AVERAGE (Y)=			0.99772292	

All instruments used in the performance of the shown calibration have traceability to the National Institute of Standards and Technology (NIST). The uncertainty ratio between the calibration standards (DM.STD.) used and the unit under test (UUT) is a minimum of 4:1, unless otherwise noted. Calibration has been performed per the shown procedure number, in accordance with ISO 10012:2003, ISO 17025:2005, ANSI/NCSL-Z-540.3, and/or MIL-STD-45662A. Test methods: API2530-92 & ASME MFC-3M-1989.

Dick Munns Company • 11133 Winners Circle • Los Alamitos, CA 90720
 Phone (714) 827-1215 • Fax (714) 827-0823

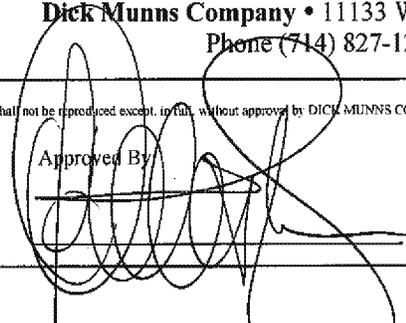
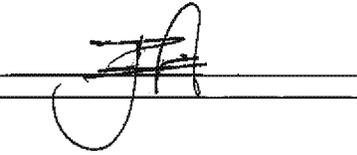
This Calibration Certificate shall not be reproduced except in full, without approval by DICK MUNNS COMPANY. The data shown applies only to the instrument being calibrated and under the stated conditions of calibration.

Date:

Approved By:

Calibration Technician:

10/30/2017

Certificate of Calibration

Certificate Number: **655889**



JJ Calibrations, Inc.

7007 SE Lake Rd
Portland, OR 97267-2105
Phone 503.786.3005
FAX 503.786.2994

Omni-Test Laboratories
13327 NE Airport Way
Portland, OR 97230

OnSite

PO: 170142

Order Date: **08/07/2017**

Authorized By: N/A



Calibration

Property #: **OMNI-00637**

User: **N/A**

Department: **N/A**

Make: **Mettler Toledo**

Model: **MS104TS/00**

Serial #: **B729400181**

Description: **Scale, Analytical, 120g**

Procedure: **DCN 500887**

Accuracy: **±0.0005g**

Calibrated on: **08/07/2017**

*Recommended Due: **02/07/2018**

Environment: **22 °C 45 % RH**

* As Received: **Within Tolerance**

* As Returned: **Within Tolerance**

Action Taken: **Calibrated**

Technician: **34**

Remarks: * Many factors may cause the unit to drift out of calibration before the recommended due date. Any reported error is the absolute value between the reference and the unit. Uncertainties include the effects of the unit.

Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
256A	Rice Lake	W0133K	Mass Set	10/28/2017	616126

Measurement Data

Parameter	Measurement Description	Range Unit	Reference	Min	Max	*Error	UUT	Uncertainty
Before/After								Accredited = ✓
Force		g	10.0000	9.9995	10.0005	0.0001	10.0001 g	5.7E-04 ✓
		g	30.0000	29.9995	30.0005	0.0001	30.0001 g	5.7E-04 ✓
		g	60.0000	59.9995	60.0005	0.0003	60.0003 g	5.7E-04 ✓
		g	90.0000	89.9995	90.0005	0.0002	90.0002 g	5.7E-04 ✓
		g	120.0000	119.9995	120.0005	0.0003	120.0003 g	5.7E-04 ✓

JJ Calibrations, Inc. certifies that this instrument has been calibrated in accordance with the JJ Calibrations Quality Assurance Manual with the stated procedure using standards that are traceable to the National Institute of Standards and Technology (NIST), or other National Measurement Institutes (NMI's), or by using natural physical constants, intrinsic standards or ratio calibration techniques. The quality system and this certificate are in compliance with ANSI/NCCL Z540-1-1994, ISO/IEC 17025-2005, ISO 10012-1, the ISO 9000 family and QS 9000. The expanded uncertainties of measurements for this calibration are based upon 95% (2 sigma) confidence limits. Unless otherwise stated, a test accuracy ratio (TAR) of 4:1, if achievable, is maintained. The results reported herein apply only to the calibration of the item described above. This report may not be reproduced, except in full, without prior written consent of JJ Calibrations, Inc. JJ Calibrations, Inc. quality system has been assessed and accredited to ISO/IEC 17025:2005.


Reviewer

3 Issued 08/14/2017

Rev # 15


Inspector

Calibration Interval: 12 months

Parameter	Date	Omni reference weights used	Weight	Scale readout	Compliance
Mass in Lbs.	12-11-08	00132	10 lb	10.0 lbs	✓
	12-11-08	00132, 255	20 lb	20.0 lbs	✓
	12-11-08	00132, 255, 274	30 lb	30.0 lbs	✓
	3/9/11	00132	10 LBS	10 LBS	X
	3/9/11	132/255	10 LBS X 2	20 LBS	X
	3/9/11	132/255/274	10 LBS X 3	30 LBS	X
	8/10/2012	00132	10 lb	10.0 lb	✓
	8/10/2012	132, 255	20 lb	20.0 lb	✓
	8/10/2012	132, 255, 274	30 lb	30.0 lb	✓
	7/19/2013	00132	10 lb	10.0 lb	✓
	7/19/2013	132, 255	20 lb	20.0 lb	✓
	7/19/2013	132, 255, 274	30 lb	30.0 lb	✓
	7/8/2014	-00132	10 lb	10.0 lb	✓
	7/9/2014	-00132, -00255	20 lb	20.0 lb	✓
	7/9/2014	-00132, -00255, -00274	30 lb	30.0 lb	✓
	7/13/2015	-00132	10 lb	10.0 lb	✓
	7/13/2015	-00132, -00255	20 lb	20.0 lb	✓
	7/13/2015	-00132, -00255, -00274	30 lb	30.0 lb	✓
	7/26/2016	omni-00283 B	1 kg	2.2 lb	✓
	7/26/2016	omni-00274	10 lb	12.2 lb	✓
	7/26/2016	omni-00255	10 lb	22.2 lb	✓
	8/14/17	omni-00283 B	1 kg	2.2 lbs	—
	8/14/17	omni-00274	10.0	12.2	—
	8/14/17	omni-00255	10.0	22.2	—

[Handwritten signatures]

[Handwritten initials]

J. Clark
J. Clark
J. Clark

J. Clark
J. Clark
J. Clark

J. Clark
J. Clark
J. Clark

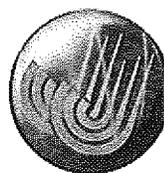
J. Clark
↓

B Davis
B Davis
B Davis

B D =
B D =
B D =

Certificate of Calibration

Certificate Number: 543402



JJ Calibrations, Inc.

7007 SE Lake Rd
Portland, OR 97267-2105
Phone 503.786.3005
FAX 503.786.2994

Omni-Test Laboratories
13327 NE Airport Way
Portland, OR 97230

PO: OTL-13-031
Order Date: 09/27/2013
Authorized By: N/A



Property #: OMNI-00283A
User: N/A
Department: N/A
Make: Troemner Inc
Model: 1mg-100g (Class F)
Serial #: 47883
Description: Mass Set, 21 Pc.
Procedure: DCN 500901
Accuracy: Class F

Calibrated on: 10/09/2013
*Recommended Due: 10/09/2018
Environment: 20 °C 41 % RH
As Received: Other - See Remarks
As Returned: Within Tolerance
Action Taken: Calibrated
Technician: 34

Remarks: * Any number of factors may cause the calibration item to drift out of calibration before the recommended interval has expired
Changed set from a Class 4 to a Class F per Jeremy Clark.
Received missing 1g weight.
Refer to attachment for measurement results.

Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
432A	Sartorius	C-44	Microbalance 5.1g	03/11/2014	517747
479A	Sartorius	MC210S	Scale, 210g	02/22/2014	517755
503A	Rice Lake	1mg-200g (Class O)	Mass Set	12/07/2013	517746
723A	Rice Lake	1mg-200g (Class O)	Mass Set	09/05/2014	540048

JJ Calibrations, Inc. certifies that this instrument has been calibrated in accordance with the JJ Calibrations Quality Assurance Manual with the stated procedure using standards that are traceable to the National Institute of Standards and Technology (NIST), or other National Measurement Institutes (NMIs), or by using natural physical constants, intrinsic standards or ratio calibration techniques. The quality system and this certificate are in compliance with ANSI/NCSL Z540-1-1994, ISO/IEC 17025-2005, ISO 10012-1, the ISO 9000 family and QS 9000. The expanded uncertainties of measurements for this calibration are based upon 95% (2 sigma) confidence limits. Unless otherwise stated, a test accuracy ratio (TAR) of 4:1, if achievable, is maintained. The results reported herein apply only to the calibration of the item described above. This report may not be reproduced, except in full, without prior written consent of JJ Calibrations, Inc.
JJ Calibrations, Inc. quality system has been assessed and accredited to ISO/IEC 17025:2005.

Reviewer

3 Issued 10/11/2013

Rev # 14

Inspector

SCALE WEIGHT CALIBRATION DATA SHEET

Weight to be calibrated: 10 lb

ID Number: 132

Standard Calibration Weight: 10 lb

ID Number: 256

Scale Used: MTW-150K

ID Number: 353

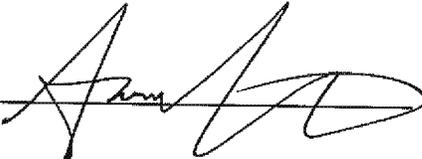
Date: 2/19/13

By: A. Kravitz

Standard Weight (A) (Lb.)	Weight Verified (B) (Lb.)	Difference (A - B)	% Error
10.0	10.0	0.0	Ø

*Acceptable tolerance is 1%.

This calibration is traceable to NIST using calibrated standard weights.

Technician signature:  Date: 2/19/13



QUALITY CONTROL SERVICES

LABORATORY EQUIPMENT • SALES • SERVICE • CALIBRATION • REPAIRS
 2340 SE 11TH Ave. Portland, Oregon 97214 • Box 14831 Portland, Oregon 97293
 (503) 236-2712 • FAX (503) 235-2535 • www.qc-services.com



OMNI-Test Laboratories, Inc.
 13327 NE Airport Way
 Portland, OR 97230

Report Number: OMNE0321676171004

A2LA ACCREDITED CERTIFICATE OF CALIBRATION WITH DATA

INSTRUMENT INFORMATION

Item	Make	Model	Serial Number	Customer ID	Location
Scale	Weigh-Tronix	WT-127 1000x0.1lb	21676	185	Lab
Units	Readability	SOP	Cal Date	Last Cal Date	Cal Due Date
lbs	0.1	QC033	10/4/17	10/11/16	10/2018

FUNCTIONAL CHECKS

SHIFT TEST		LINEARITY		REPEATABILITY		ENVIRONMENTAL CONDITIONS
Test Wt:	Tol:	Test Wt:	Tol:	Test Wt:	Tol:	<input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor Temperature: 21.0°C
500	0.5	HB44	HB44	200	0.2	
As-Found:		As-Found:		As-Found:		
Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	
As-Left:		As-Left:		As-Left:		
Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	

CALIBRATION DATA

Standard	As-Found	As-Left	Expanded Uncertainty
1000	1000.0	1000.0	0.12
700	700.0	700.0	0.12
500	500.0	500.0	0.08
200	200.0	200.0	0.08
100	100.0	100.0	0.05
50	50.0	50.0	0.05

CALIBRATION STANDARDS

Item	Make	Model	Serial Number	Cal Date	Cal Due Date	NIST ID
Avoirdupois Cast W	Rice Lake	25 and 50lb	PWO990-CA	11/4/15	11/2017	20152112

Permanent Information Concerning this Equipment:

Comments/Information Concerning this Calibration

Report prepared/reviewed by: ①

Date: 10.4.17

Technician: D. Oudeans

Signature: [Signature]

THIS CERTIFICATE SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE APPROVAL OF QUALITY CONTROL SERVICES, INC.

The uncertainty is calculated according to the ISO Guide to the Expression of Uncertainty in Measurement and includes the uncertainty of standards used combined with the observed standard deviation of the unit under test. The uncertainty is expanded with a k factor of 2 for an approximate 95% level of confidence. Instruments listed above were calibrated using standards traceable to the National Institute of Standards and Technology (NIST). Calibration data reflect results at the time and location of calibration. Calibration data should be reviewed to insure that the instrument is performing to its required accuracy.

Quality Control Services

Report of Service and Calibration

2340 S.E. 11TH AVENUE 53843
 PORTLAND, OR 97214
 PHONE 503-236-2712

Sold To OMNI-Test Laboratories, Inc. PT ID: OMNE03 P.O. No: 170148
 Address PO Box 301367 Contact: Bruce Davis
 City Portland, OR 97294 Phone: 503-643-3788
 Ship To 13327 NE Airport Way Portland, OR 97230 Email: bdavis@omni-test.com

No	Item	Make	Model	Serial Number	Location	Contact	Rate	Date Svc'd	Tech	Cust ID
1	Scale	Weigh-Tronix	WI-125x5000x0	53719	Lab	Ken Morgan	\$150.00	10/4	18/10	356
2	Scale	Weigh-Tronix	WI-127 1000x0	21676	Lab	Ken Morgan	\$150.00	10/4	18/10	185

Service / Calibration Certificate of Calibration
 Documentation Requirements Calibration with Data
 A2LA Certificate

Received By: _____ Date: _____

Comments: Truck charge \$95.00
\$125.00 Balance Letter



453
National
Weather
Service
Type

OMNI 00209

Instruction Booklet

for use with

PRINCO

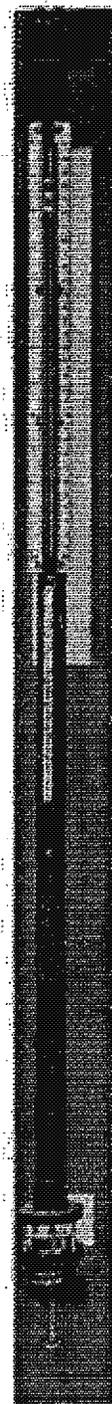
Fortin type mercurial

Barometers

Manufactured by

PRINCO INSTRUMENTS, INC.
1020 Industrial Blvd.
Southampton, Pa. 18966-4095
U.S.A.

Phone: 215 355-1500
Fax: 215 355-7766



469
NOVA™
Economy
Model

Thermal Metering System Calibration

Y Factor

Manufacturer: APEX
 Model: XC-60-EP
 Serial Number: 606001
 OMNI Tracking No.: OMNI-00335
 Calibrated Orifice: Yes

Date	1/3/2017	Acceptable Deviation (5%)	Deviation
y Factor	0.984	0.0492	0.003
Acceptance	Acceptable		

Average Gas Meter y Factor
0.981

Orifice Meter dH@
N/A

Calibration Date: 07/18/17
 Calibrated by: B. Davis
 Calibration Frequency: Six months
 Next Calibration Due: 1/18/2018
 Instrument Range: 1.000 cfm
 Standard Temp.: 68 oF
 Standard Press.: 29.92 "Hg
 Barometric Press., Pb: 30.08 "Hg
 Signature/Date: *[Signature]* 7/18/2017

Acceptable y Deviation	0.020
Maximum y Deviation	0.005
Acceptable dH@ Deviation	N/A
Maximum dH@ Deviation	N/A
Acceptance	Acceptable

Standard Calibrator	Model	Standard Test Meter
	S/N	OMNI-00001
	Calib. Date	27-Oct-16
	Calib. Value	0.9823 y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Reference Meter Pressure ("H2O), Pr	0.00	0.00	0.00
DGM Pressure ("H2O), Pd	2.25	1.30	0.75
Initial Reference Meter	749.4	756.7	762.5
Final Reference Meter	756.6	762.4	770.3
Initial DGM	0	0	0
Final DGM	7.245	5.798	7.977
Temp. Ref. Meter (°F), Tr	71.5	72.7	73.9
Temperature DGM (°F), Td	80.0	82.0	84.0
Time (min)	34.0	35.0	63.5
Net Volume Ref. Meter, Vr	7.200	5.700	7.800
Net Volume DGM, Vd	7.245	5.798	7.977
Gas Meter y Factor =	0.986	0.979	0.977
Gas Meter y Factor Deviation (from avg.)	0.005	0.001	0.004
Orifice dH@	N/A	N/A	N/A
Orifice dH@ Deviation (from avg.)	N/A	N/A	N/A

where:

1. Deviation = |Average value for all runs - current run value|
- ** 2. $y = [Vr \times (y \text{ factor (ref)}) \times (Pb + (Pr / 13.6)) \times (Td + 460)] / [Vd \times (Pb + (Pd / 13.6)) \times (Tr + 460)]$
- ** 3. $dH@ = 0.0317 \times Pd / (Pb (Td + 460)) \times [(Tr + 460) \times \text{time}] / Vr]^2$

* Reference calibration is traceable to NIST through NIST Test # 40674, Kimble ASTM E1272, or NIST traceable laboratory

** Equations come from EPA Method 5

The uncertainty of measurement is $\pm 0.14 \text{ ft}^3/\text{min}$. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.

DIFFERENTIAL PRESSURE GAUGE CALIBRATION DATA SHEET

Instrument to be calibrated: Pressure Transducer

Maximum Range: 0-2" W.C. ID Number: OMNI-00335

Calibration Instrument: Digital Manometer ID Number: OMNI-00633

Date: 7/18/17 By: B. Davis

This form is to be used only in conjunction with Standard Procedure C-SPC.

Range of Calibration Point ("WC)	Digital Manometer Input ("WC)	Pressure Gauge Response ("WC)	Difference (Input - Response)	% Error of Full Span*
0-20% Max. Range 0 - 0.4	0.034 0.203	0.030 0.203	0.000	0.2 0
20-40% Max. Range 0.4 - 0.8	0.563	0.574	0.011	0.55
40-60% Max. Range 0.8 - 1.2	1.001	1.023	0.022	1.10
60-80% Max. Range 1.2 - 1.6	1.464 0.147	1.503	0.039	1.95
80-100% Max. Range 1.6 - 2.0	1.940	1.994	0.054	2.7

*Acceptable tolerance is 4%.

The uncertainty of measurement is ±0.4" WC. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.

Technician signature:  Date: 7/18/17

Reviewed by:  Date: 7/19/2017

Temperature Calibration EPA Method 28R, ASTM 2515								
BOOTH:		TEMPERATURE MONITOR TYPE:				EQUIPMENT NUMBER:		
E1		National Instruments Logger				00335, 00336		
REFERENCE METER EQUIPMENT NUMBER: 00373					Calibration Due Date: 8/02/17			
CALIBRATION PERFORMED BY:			DATE:		AMBIENT TEMPERATURE:		BAROMETRIC PRESSURE:	
B. Davis			7/18/17		68		30.08	
Input Temperature (F)	Ambient	Meter A					Tunnel	FB Interior
			Meter B	Filter A	Filter B			
0	1	1	1	1	1	0	0	
100	101	101	101	101	100	100	100	
300	301	300	300	300	300	300	300	
500	501	500	500	500	500	500	500	
700	701	700	700	700	700	700	700	
1000	1001	1000	1000	1000	1000	1000	1000	

Input (F)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Imp A	Imp B	Cat	Stack
0	0	0	0	0	0	1	1	1	0
100	100	100	100	100	100	101	101	100	100
300	300	300	300	300	300	300	300	300	300
500	500	500	500	500	500	500	500	500	500
700	700	700	700	700	700	700	700	700	700
1000	1000	1000	1000	1000	1000	1000	1000	1000	1000

1500

1500

2000

2000

Technician signature: 

Date: 7/18/17

Reviewed By: 

Date: 7/19/2017

Thermal Metering System Calibration Y Factor

Manufacturer: APEX
 Model: XC-60-EP
 Serial Number: 606002
 OMNI Tracking No.: OMNI-00336
 Calibrated Orifice: Yes

Average Gas Meter y Factor
0.984

Orifice Meter dH@
N/A

Calibration Date: 07/18/17
 Calibrated by: B. Davis
 Calibration Frequency: Six months
 Next Calibration Due: 1/18/2018
 Instrument Range: 1.000 cfm
 Standard Temp.: 68 oF
 Standard Press.: 29.92 "Hg
 Barometric Press., Pb: 30.08 "Hg
 Signature/Date: *[Signature]* 7/18/17
[Signature] 7/19/2017

Previous Calibration Comparison

Date	1/3/2017	Acceptable Deviation (5%)	Deviation
y Factor	0.99	0.0495	0.006
Acceptance	Acceptable		

Current Calibration

Acceptable y Deviation	0.020
Maximum y Deviation	0.002
Acceptable dH@ Deviation	N/A
Maximum dH@ Deviation	N/A
Acceptance	Acceptable

Reference Standard *

Standard Calibrator	Model	Standard Test Meter
	S/N	OMNI-00001
	Calib. Date	27-Oct-16
	Calib. Value	0.9823 y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Reference Meter Pressure ("H2O), Pr	0.00	0.00	0.00
DGM Pressure ("H2O), Pd	1.95	1.20	0.80
Initial Reference Meter	771.3	777.8	785.1
Final Reference Meter	777.7	785	790.6
Initial DGM	0	0	0
Final DGM	6.459	7.298	5.583
Temp. Ref. Meter (°F), Tr	75.1	76.1	77.8
Temperature DGM (°F), Td	85.0	85.0	88.0
Time (min)	30.0	41.8	40.0
Net Volume Ref. Meter, Vr	6.400	7.200	5.500
Net Volume DGM, Vd	6.459	7.298	5.583
Gas Meter y Factor =	0.987	0.982	0.984
Gas Meter y Factor Deviation (from avg.)	0.002	0.002	0.000
Orifice dH@	N/A	N/A	N/A
Orifice dH@ Deviation (from avg.)	N/A	N/A	N/A

where:

1. Deviation = |Average value for all runs - current run value|
- ** 2. $y = [Vr \times (y \text{ factor (ref)}) \times (Pb + (Pr / 13.6))] \times (Td + 460) / [Vd \times (Pb + (Pd / 13.6))] \times (Tr + 460)$
- ** 3. $dH@ = 0.0317 \times Pd / (Pb (Td + 460)) \times [(Tr + 460) \times \text{time}] / Vr]^2$

* Reference calibration is traceable to NIST through NIST Test # 40674, Kimble ASTM E1272, or NIST traceable laboratory

** Equations come from EPA Method 5

The uncertainty of measurement is $\pm 0.14 \text{ ft}^3/\text{min}$. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.

DIFFERENTIAL PRESSURE GAUGE CALIBRATION DATA SHEET

Instrument to be calibrated: Pressure Transducer

Maximum Range: 0-2" W.C. ID Number: OMNI-00336

Calibration Instrument: Digital Manometer ID Number: OMNI-00633

Date: 7/18/17 By: B. Davis

This form is to be used only in conjunction with Standard Procedure C-SPC.

Range of Calibration Point ("WC)	Digital Manometer Input ("WC)	Pressure Gauge Response ("WC)	Difference (Input - Response)	% Error of Full Span*
0-20% Max. Range 0 - 0.4	0.044 0.260	0.039 0.256	0.005 0.004	0.25 0.20
20-40% Max. Range 0.4 - 0.8	0.693	0.696	0.003	0.15
40-60% Max. Range 0.8 - 1.2	1.021	1.029	0.008	0.40
60-80% Max. Range 1.2 - 1.6	1.529	1.540	0.011	0.55
80-100% Max. Range 1.6 - 2.0	1.917	1.940	0.023	1.15

*Acceptable tolerance is 4%.

The uncertainty of measurement is ± 0.4 " WC. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.

Technician signature:  Date: 7/18/17

Reviewed by:  Date: 7/19/2017

Temperature Calibration EPA Method 28R, ASTM 2515							
BOOTH:		TEMPERATURE MONITOR TYPE:				EQUIPMENT NUMBER:	
E1		National Instruments Logger				00335, 00336	
REFERENCE METER EQUIPMENT NUMBER: 00373				Calibration Due Date: 8/02/17			
CALIBRATION PERFORMED BY:		DATE:		AMBIENT TEMPERATURE:		BAROMETRIC PRESSURE:	
B. Davis		7/18/17		68		30.08	
Input Temperature (F)	Ambient	Meter A					FB Interior
			Meter B	Filter A	Filter B	Tunnel	
0	1	1	1	1	1	0	0
100	101	101	101	101	100	100	100
300	301	300	300	300	300	300	300
500	501	500	500	500	500	500	500
700	701	700	700	700	700	700	700
1000	1001	1000	1000	1000	1000	1000	1000

Input (F)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Imp A	Imp B	Cat	Stack
0	0	0	0	0	0	1	1	1	0
100	100	100	100	100	100	101	101	100	100
300	300	300	300	300	300	300	300	300	300
500	500	500	500	500	500	500	500	500	500
700	700	700	700	700	700	700	700	700	700
1000	1000	1000	1000	1000	1000	1000	1000	1000	1000

1500
2000

1500
2000

Technician signature:  Date: 7/18/17
 Reviewed By:  Date: 7/19/2017

J-2000

owners manual



VWR Temperature Hygrometer Calibration Procedure and Data Sheet

Frequency: Every Two Years

Step 1: Locate NIST traceable standard.

Step 2: Place unit to be calibrated, tracking No. OMNI-00592, inside OMNI desiccator box on the same shelf with the NIST traceable standard.

Step 3: After a period of not less than four hours record the temperature and humidity of both units in the spaces provide below.

Step 4: If the unit to be calibrated matches the NIST standard within $\pm 4\%$, it is acceptable. If not, the unit needs to be sent to a repair company or replaced.

Verification Data:

Date: 1/8/2018 Technician: B Davis

Time in desiccator: 0910 Recording time: 1335

NIST Standard Temperature: 28.3 °F NIST Standard Humidity: 74.5

Test Unit Temperature Reading: 25.4 °F Test Unit Humidity Reading: 74.3

Test unit OMNI- 00592 is X or was not within acceptable limits.

Technician Signature: B Davis

Comments: Full scale of OMNI-00592 is 90% RH, with a difference of 2.9 this gives a error percentage of 3.22%. This value is within the allowable 4%.

VWR Temperature Hygrometer Calibration Procedure and Data Sheet

Frequency: Every Two Years

Step 1: Locate NIST traceable standard.

Step 2: Place unit to be calibrated, tracking No. OMNI-00592, inside OMNI desiccate box on the same shelf with the NIST traceable standard.

Step 3: After a period of not less than four hours record the temperature and humidity of both units in the spaces provide below.

Step 4: If the unit to be calibrated matches the NIST standard within $\pm 4\%$, it is acceptable. If not, the unit needs to be sent to a repair company or replaced.

Verification Data:

Date: 1/5/17 Technician: B DAVIS

Time in desiccate: 0900 Recording time: 0845 1/6/17

NIST Standard Temperature: 67.5 °F NIST Standard Humidity: 9.5

Test Unit Temperature Reading: 66.9 °F Test Unit Humidity Reading: 6.1

Test unit OMNI- 00592 is X or was not within acceptable limits.

Technician Signature: 

Comments: Humidity Results of 00592 are within $\pm 4\%$ of Reference *mehg*
BD

Certificate of Calibration

Certificate Number: **659360**



JJ Calibrations, Inc.

7007 SE Lake Rd
Portland, OR 97267-2105
Phone 503.786.3005
FAX 503.786.2994

Omni-Test Laboratories
13327 NE Airport Way
Portland, OR 97230

PO: 170149
Order Date: 09/22/2017
Authorized By: N/A



Property #: **OMNI-00410**
User: **N/A**
Department: **N/A**
Make: **Dwyer**
Model: **1430**
Serial #: **OMNI-00410**
Description: **Microtector**
Procedure: **SEND TO VENDOR**
Accuracy: **±0.00025" WC**

Calibrated on: **10/11/2017**
*Recommended Due: **10/11/2018**
Environment: **19 °C 52 % RH**
* As Received: **Limited**
* As Returned: **Limited**
Action Taken: **Calibrated**
Technician: **34**

Remarks: * Many factors may cause the unit to drift out of calibration before the recommended due date. Any reported error is the absolute value between the reference and the unit. Uncertainties include the effects of the unit.

Limited Calibration (est.2016) - Calibrated micrometer head only.

Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
541A	Select	E8FED2	8 Piece Gage Block Set	12/14/2017	635720
103A	Brown & Sharpe	598-81-14	Gage Block Set, 81 pc.	03/16/2019	643452
368A	Rutland	2225-7081	81 Piece Gage Block Set	06/01/2018	649394

Measurement Data

Parameter	Measurement Description	Range Unit	Reference	Min	Max	Error	UUT	Uncertainty
Before/After Length								Accredited = ✓
		Inch	0.1300	0.129	0.131	0.000	0.130 Inch	1.1E-03 ✓
		Inch	0.3850	0.384	0.386	0.000	0.385 Inch	1.1E-03 ✓
		Inch	0.6150	0.614	0.616	0.000	0.615 Inch	1.1E-03 ✓
		Inch	0.8700	0.869	0.871	0.000	0.870 Inch	1.1E-03 ✓
	Inch	1.0000	0.999	1.001	0.000	1.000 Inch	1.1E-03 ✓	

JJ Calibrations, Inc. certifies that this instrument has been calibrated in accordance with the JJ Calibrations Quality Assurance Manual with the stated procedure using standards that are traceable to the National Institute of Standards and Technology (NIST), or other National Measurement Institutes (NMI's), or by using natural physical constants, intrinsic standards or ratio calibration techniques. The quality system and this certificate are in compliance with ANSI/NCCL Z540-1-1994, ISO/IEC 17025-2005, ISO 10012-1, the ISO 9000 family and QS 9000. The expanded uncertainties of measurements for this calibration are based upon 95% (2 sigma) confidence limits. Unless otherwise stated, a test accuracy ratio (TAR) of 4:1, if achievable, is maintained. The results reported herein apply only to the calibration of the item described above. This report may not be reproduced, except in full, without prior written consent of JJ Calibrations, Inc. JJ Calibrations, Inc. quality system has been assessed and accredited to ISO/IEC 17025:2005.

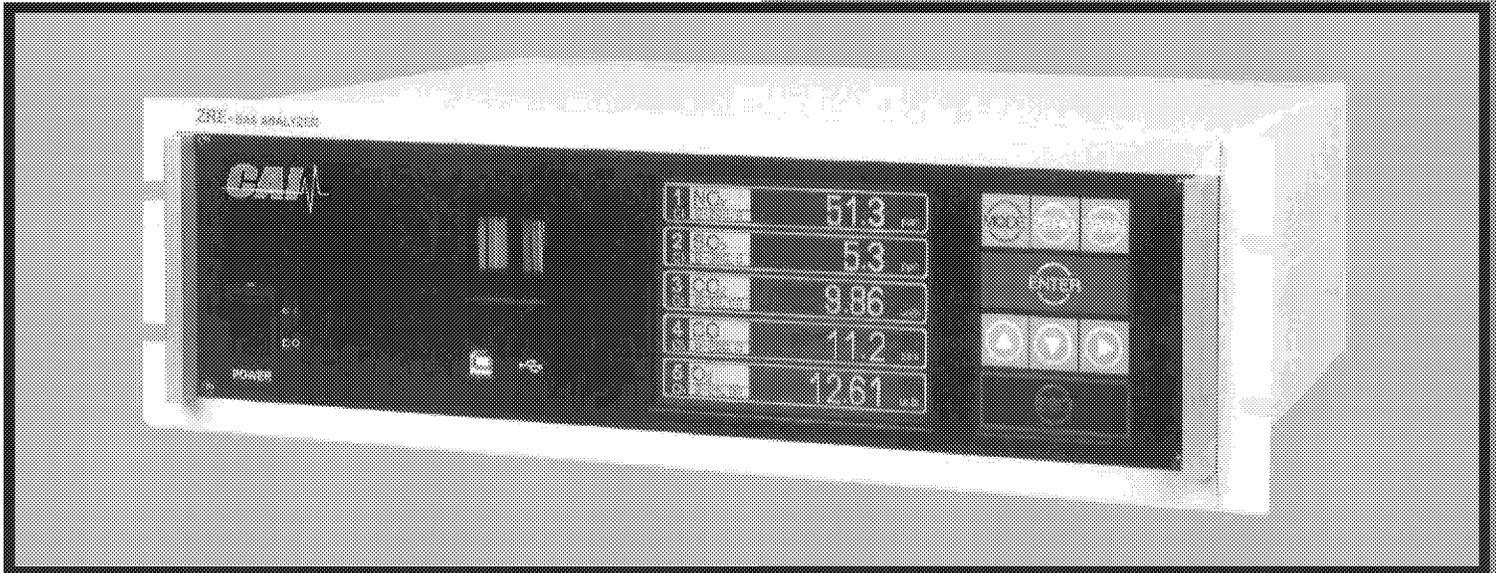

Reviewer

3 Issued 10/13/2017 Rev # 15


Inspector

ZRE

NDIR/O₂



USER'S

MANUAL



1312 West Grove Avenue
Orange, CA 92865-4134
Phone: 714-974-5560 Fax: 714-921-2531¹²⁷
www.gasanalyzers.com

NIST Stopwatch Calibration, Time Proficiency Testing Procedure and Data Sheet

Date: 8/17/17 User/Technician: N. Sodergren Pass Fail

NIST traceable stopwatch OMNI tracking number: 00565 Last Cal: 06/27/2017

Stopwatch to be tested for time proficiency OMNI tracking number: 00567

1. Start the NIST traceable stopwatch: at a predetermined time (i.e. 1.00 minutes), the technician shall start the watch being tested. When 15.00 seconds have passed (i.e. the NIST traceable stopwatch reads 1 minute, 15 seconds), the technician shall stop the watch being tested. Record the target time interval (i.e. 15.00 seconds). Repeat this step twice and record the data.
2. Repeat step #1 for each of the following target time intervals: 30.00 seconds, 10.00 minutes, and 30 minutes.
3. If the delta between the target time and measured time is less than 5% of the target time interval or 2.00 seconds (whichever is less), then the technician has demonstrated proficiency with the specific instrument utilized in the proficiency test. The proficiency is valid for a period of 12 months.
4. Archive the proficiency test data and information, including the effective date and expiration date of the proficiency, in the equipment record for the instrument involved.

Target time: <u>15.00 seconds</u>	#1 Measured time: <u>15.05</u>	#2 Measured time: <u>14.96</u>	#3 Measured time: <u>15.00</u>
Target time: <u>30.00 seconds</u>	#1 Measured time: <u>30.19</u>	#2 Measured time: <u>30.18</u>	#3 Measured time: <u>29.84</u>
Target time: <u>45.00 seconds</u>	#1 Measured time: <u>44.98</u>	#2 Measured time: <u>44.79</u>	#3 Measured time: <u>44.89</u>
Target time: <u>60.00 seconds</u>	#1 Measured time: <u>59.97</u>	#2 Measured time: <u>59.94</u>	#3 Measured time: <u>59.97</u>
Target time: <u>10.00 minutes</u>	#1 Measured time: <u>9'59"78</u>	#2 Measured time: <u>9'59"90</u>	#3 Measured time: <u>10'00"15</u>
Target time: <u>30.00 minutes</u>	#1 Measured time: <u>29'59"40</u> <u>30'00"23</u>	#2 Measured time: <u>30'00"06</u>	#3 Measured time: <u>29'59"97</u>

The uncertainty of measurement is ± 1 sec. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.

This calibration procedure is confirmed by the manufacturer as a proper method for evaluating the accuracy of timers.

Technician Signature: [Signature] Date: 8/17/17

Reviewed by: [Signature] Date: 8/2/17

WOOD MOISTURE CONTENT CALIBRATION WORKSHEET

Moisture Content Standard OMNI ID #: 00431

Reference Moisture Content Standard: OMNI # 00430

Date	Temp.	Barometric Pressure	Fixed Moisture %	Fixed Moisture %	Observed Moisture %		Initials
11/14/16	68° F	30.10 in-Hg	22%	12%	22%	12%	AD
5/10/17	70° F	30.14 in-Hg	22%	12%	22%	12%	AD
11/17/17	70° F	30.23 in-Hg	22%	12%	22%	12%	WHS
			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			
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			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			

Notes: _____

Technician signature:  Date: 11/15/16

Example Calculations

Equations and Sample Calculations – ASTM E2780 & E2515

Manufacturer: Hearth & Home
Model: ~~Intrepid IV Catalytic~~ Intrepid IV Catalytic - KJM 2/12/18
Run: 2
Category: 1

Equations used to calculate the parameters listed below are described in this appendix. Sample calculations are provided for each equation. The raw data and printout results from a sample run are also provided for comparison to the sample calculations.

M_{Sdb} – Weight of test fuel spacers, dry basis, kg

M_{Cdb} – Weight of test fuel crib, excluding nails and spacers, dry basis, kg

D_{Cdb} - Density of fuel crib, excluding spacers and nails, dry basis, lbs/ft³

M_{FTAdb} - Total weight of fuel crib excluding nails, dry basis, kg

BR – Dry burn rate, kg/hr

V_s – Average gas velocity in the dilution tunnel, ft/sec

Q_{sd} – Average gas flow rate in dilution tunnel, dscf/hr

$V_{m(std)}$ – Volume of gas sampled, corrected to dry standard conditions, dscf

m_n – Total particulate matter collected, mg

C_s - Concentration of particulate matter in tunnel gas, dry basis, corrected to standard conditions, g/dscf

E_T – Total particulate emissions, g

PR - Proportional rate variation

PM_R – Particulate emissions for test run, g/hr

PM_F – Particulate emission factor for test run, g/dry kg of fuel burned

M_{Sdb} – Weight of test fuel spacers, dry basis, kg

ASTM E2780 equation (1)

$$M_{Sdb} = (M_{Swb})(100/(100 + FM_S))$$

Where,

FM_S = average fuel moisture of test fuel spacers, % dry basis

M_{Swb} = weight of test fuel spacers, wet basis, kg

Sample Calculation:

$$FM_S = 16.4 \%$$

$$M_{Swb} = 2.2 \text{ lbs}$$

0.4536 = Conversion factor from lbs to kg

$$M_{Sdb} = [(2.2 \times 0.4536)(100/(100 + 16.4))]$$

$$M_{Sdb} = \mathbf{0.86 \text{ kg}}$$

M_{Cdb}– Weight of test fuel crib, excluding nails and spacers, dry basis, kg
ASTM E2780 equation (2)

$$M_{Cdb} = \Sigma[(M_{CPnwb})(100/(100 + FM_{CPn}))]$$

Where,

- M_{CPnwb} = weight of each test fuel piece n in fuel crib, excluding nails and spacers, wet basis, kg
 FM_{CPn} = Average fuel moisture of test fuel n in fuel crib, % dry basis

Sample Calculation (test fuel piece 1):

$$\begin{aligned} M_{CPnwb} &= 1.4 \\ FM_{CPn} &= 20.6 \\ &= 1.4 (100/(100+ 20.6)) \\ &= 1.2 \text{ lbs} \end{aligned}$$

$$\begin{aligned} \text{Total crib weight, excluding spacer} &= 5.24 \text{ lbs} \\ M_{Cdb} &= \mathbf{2.38 \text{ kg}} \end{aligned}$$

D_{Cdb} - Density of fuel crib, excluding spacers and nails, dry basis, lbs/ft³
ASTM E2780 equation (3)

$$D_{Cdb} = M_{Cdb}/V_C$$

Where,

$$V_C = \text{Volume of fuel crib, ft}^3$$

Sample calculation:

$$V_C = 354 \text{ in}^3$$

$$1728 = \text{conversion from in}^3 \text{ to ft}^3$$

$$D_{Cdb} = 5.24 / 354 * 1728$$

$$= \mathbf{25.6 \text{ lbs/ft}^3}$$

M_{FTAdb} - Total weight of fuel crib excluding nails, dry basis, kg
ASTM E2780 equation (4)

$$M_{FTAdb} = M_{Sdb} + M_{Cdb}$$

Sample calculation:

$$M_{FTAdb} = 0.86 + 2.38$$

$$= \mathbf{3.23 \text{ kg}}$$

BR – dry burn rate, kg/hr

ASTM E2780 equation (5)

$$BR = \frac{60 M_{FTAdb}}{\theta}$$

Where,

$$\theta = \text{Total length of test run, min}$$

Sample Calculation:

$$M_{Bdb} = 3.23 \quad \text{kg}$$

$$\theta = 266 \quad \text{min}$$

$$BR = \frac{60 \times 3.23}{266}$$

$$BR = \mathbf{0.73} \quad \text{kg/hr}$$

V_s – Average gas velocity in the dilution tunnel, ft/sec

ASTM E2515 equations (9)

$$V_s = F_p \times k_p \times C_p \times (\sqrt{\Delta P})_{avg} \times \sqrt{\frac{T_{s(avg)}}{P_s \times M_s}}$$

Where:

- F_p = Adjustment factor for center of tunnel pitot tube placement, $F_p = \frac{V_{strav}}{V_{scent}}$, ASTM E2515 Equation (1)
- V_{scent} = Dilution tunnel velocity calculated after the multi-point pitot traverse at the center, ft/sec
- V_{strav} = Dilution tunnel velocity calculated after the multi-point pitot traverse, ft/sec
- k_p = Pitot tube constant, 85.49
- C_p = Pitot tube coefficient: 0.99, unitless
- ΔP* = Velocity pressure in the dilution tunnel, in H₂O
- T_s = Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)
- P_s = Absolute average gas static pressure in dilution tunnel, = P_{bar} + P_g, in Hg
- P_{bar} = Barometric pressure at test site, in. Hg
- P_g = Static pressure of tunnel, in. H₂O; (in Hg = in H₂O/13.6)
- M_s = **The dilution tunnel wet molecular weight; M_s = 28.78 assuming a dry weight of 29 lb/lb-mole

Sample calculation:

$$F_p = \frac{13.24}{15.06} = 0.879$$

$$V_s = 0.879 \times 85.49 \times 0.99 \times 0.224 \times \left(\frac{85.3 + 460}{\left(30.08 + \frac{-0.18}{13.6} \right) \times 28.78} \right)^{1/2}$$

$$V_s = 13.21 \text{ ft/s}$$

*The ASTM test standard mistakenly has the square root of the average delta p instead of the average of the square root of delta p. The current EPA Method 2 is also incorrect. This was verified by Mike Toney at EPA.

**The ASTM test standard mistakenly identifies M_s as the dry molecular weight. It should be the wet molecular weight as indicated in EPA Method 2.

Q_{sd} – Average gas flow rate in dilution tunnel, dscf/hr

ASTM E2515 equation (3)

$$Q_{sd} = 3600 \times (1 - B_{ws}) \times v_s \times A \times \frac{T_{std}}{T_{s(avg)}} \times \frac{P_s}{P_{std}}$$

Where:

- 3600 = Conversion from seconds to hours (ASTM method uses 60 to convert in minutes)
- B_{ws} = Water vapor in gas stream, proportion by volume; assume 2%
- A = Cross sectional area of dilution tunnel, ft²
- T_{std} = Standard absolute temperature, 528 °R
- P_s = Absolute average gas static pressure in dilution tunnel, = P_{bar} + P_g, in Hg
- T_{s(avg)} = Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)
- P_{std} = Standard absolute pressure, 29.92 in Hg

Sample calculation:

$$Q_{sd} = 3600 \times (1 - 0.02) \times 13.21 \times 0.196 \times \frac{528}{85.3 + 460} \times \frac{30.1 + \frac{-0.18}{13.6}}{29.92}$$

Q_{sd} = **8902.0** dscf/hr

$V_{m(std)}$ – Volume of Gas Sampled Corrected to Dry Standard Conditions, dscf
 ASTM E2515 equation (6)

$$V_{m(std)} = K_1 V_m Y \frac{P_{bar} + \left(\frac{\Delta H}{13.6} \right)}{T_m}$$

Where:

- K_1 = 17.64 °R/in. Hg
- V_m = Volume of gas sample measured at the dry gas meter, dcf
- Y = Dry gas meter calibration factor, dimensionless
- P_{bar} = Barometric pressure at the testing site, in. Hg
- ΔH = Average pressure differential across the orifice meter, in. H₂O
- T_m = Absolute average dry gas meter temperature, °R

Sample Calculation:

Using equation for Train 1:

$$V_{m(std)} = 17.64 \times 43.854 \times 0.981 \times \frac{\left(30.08 + \frac{1.35}{13.6} \right)}{\left(81.3 + 460 \right)}$$

$$V_{m(std)} = \mathbf{42.309} \text{ dscf}$$

Using equation for Train 2:

$$V_{m(std)} = 17.64 \times 43.627 \times 0.984 \times \frac{\left(30.08 + \frac{1.14}{13.6} \right)}{\left(81.6 + 460 \right)}$$

$$V_{m(std)} = \mathbf{42.176} \text{ dscf}$$

Using equation for ambient train:

$$V_{m(std)} = 17.64 \times 0.00 \times 0 \times \frac{\left(30.08 + \frac{0.00}{13.6} \right)}{\left(71.2 + 460 \right)}$$

$$V_{m(std)} = \mathbf{0} \text{ dscf}$$

m_n – Total Particulate Matter Collected, mg

ASTM E2515 Equation (12)

$$m_n = m_p + m_f + m_g$$

Where:

m_p = mass of particulate matter from probe, mg

m_f = mass of particulate matter from filters, mg

m_g = mass of particulate matter from filter seals, mg

Sample Calculation:

Using equation for Train 1 (first hour):

$$m_n = 0.0 + 0.5 + 0.0$$

$$m_n = 0.5 \text{ mg}$$

Using equation for Train 1 (post-first hour):

$$m_n = 0.0 + 0.0 + 0.4$$

$$m_n = 0.4 \text{ mg}$$

Train 1 aggregate:

$$m_n = 0.5 + 0.4$$

$$m_n = \mathbf{0.9} \text{ mg}$$

Using equation for Train 2:

$$m_n = 0 + 0.7 + 0.3$$

$$m_n = \mathbf{1} \text{ mg}$$

C_s - Concentration of particulate matter in tunnel gas, dry basis, corrected to standard conditions, g/dsc
ASTM E2515 equation (13)

$$C_s = K_2 \times \frac{m_n}{V_{m(std)}}$$

Where:

K₂ = Constant, 0.001 g/mg

m_n = Total mass of particulate matter collected in the sampling train, mg

V_{m(std)} = Volume of gas sampled corrected to dry standard conditions, dscf

Sample calculation:

For Train 1:

$$C_s = 0.001 \times \frac{0.9}{42.31}$$

$$C_s = \mathbf{0.00002} \text{ g/dscf}$$

For Train 2

$$C_s = 0.001 \times \frac{1.0}{42.18}$$

$$C_s = \mathbf{0.00002} \text{ g/dscf}$$

For Ambient Train

$$C_r = 0.001 \times \frac{0.0}{0}$$

$$C_r = \mathbf{0} \text{ g/dscf}$$

E_T – Total Particulate Emissions, g

ASTM E2515 equation (15)

$$E_T = (C_s - C_r) \times Q_{std} \times \theta$$

Where:

- C_s = Concentration of particulate matter in tunnel gas, g/dscf
- C_r = Concentration particulate matter room air, g/dscf
- Q_{std} = Average dilution tunnel gas flow rate, dscf/hr
- θ = Total time of test run, minutes

Sample calculation:

For Train 1

$$E_T = (\underline{0.000021} - 0) \times \underline{8902.0} \times \underline{266} / 60$$

$$E_T = \underline{0.84} \text{ g}$$

For Train 2

$$E_T = (\underline{0.000024} - 0) \times \underline{8902.0} \times \underline{266} / 60$$

$$E_T = \underline{0.94} \text{ g}$$

Average

$$E = \underline{0.89} \text{ g}$$

Total emission values shall not differ by more than 7.5% from the total average emissions

$$7.5\% \text{ of the average} = \underline{0.07}$$

$$\text{Train 1 difference} = \underline{0.05}$$

$$\text{Train 2 difference} = \underline{0.05}$$

PR - Proportional Rate Variation

ASTM E2515 equation (16)

$$PR = \left[\frac{\theta \times V_{mi} \times V_s \times T_m \times T_{si}}{\theta_i \times V_m \times V_{si} \times T_m \times T_s} \right] \times 100$$

Where:

- θ = Total sampling time, min
- θ_i = Length of recording interval, min
- V_{mi} = Volume of gas sample measured by the dry gas meter during the "ith" time interval, dcf
- V_m = Volume of gas sample as measured by dry gas meter, dcf
- V_{si} = Average gas velocity in the dilution tunnel during the "ith" time interval, ft/sec
- V_s = Average gas velocity in the dilution tunnel, ft/sec
- T_{mi} = Absolute average dry gas meter temperature during the "ith" time interval, °R
- T_m = Absolute average dry gas meter temperature, °R
- T_{si} = Absolute average gas temperature in the dilution tunnel during the "ith" time interval, °R
- T_s = Absolute average gas temperature in the dilution tunnel, °R

Sample calculation (for the first 1 minute interval of Train 1):

$$PR = \left(\frac{266 \times 0.156 \times 13.21 \times (125.0 + 460) \times (81.3 + 460)}{1 \times 43.85 \times 13.68 \times (85.3 + 460) \times (75.0 + 460)} \right) \times 100$$

$$PR = \underline{99} \%$$

PM_R – Particulate emissions for test run, g/hr

ASTM E2780 equation (6)

$$PM_R = 60 (E_T/\theta)$$

Where,

E_T = Total particulate emissions, grams

θ = Total length of full integrated test run, min

Sample Calculation:

$$E_T (\text{Dual train average}) = 0.89 \text{ g}$$

$$\theta = 266 \text{ min}$$

$$PM_R = 60 \times (0.89 / 266)$$

$$PM_R = \mathbf{0.20} \text{ g/hr}$$

PM_F – Particulate emission factor for test run, g/dry kg of fuel burned
ASTM E2780 equation (7)

$$PM_F = E_T / M_{FTAdb}$$

Sample Calculation:

$$E_T \text{ (Dual train average)} = 0.89 \text{ g}$$

$$M_{Bdb} = 3.23 \text{ kg}$$

$$PM_F = 0.89 / 3.23$$

$$PM_F = \mathbf{0.27} \text{ g/kg}$$

*Model: Intrepid FlexBurn Catalytic
Hearth and Home Technologies
352 Mountain House Road
Halifax, PA 17032*

Section 5

Labeling & Owner's Manual



MODEL / MODÈLE: "Intrepid FlexBurn® 2115/2115-CAT"
LISTED SOLID FUEL ROOM HEATER BURNING FIREPLACE STOVE
HOMOLOGUE POÈLE A COMBUSTIBLE SOLIDES

Serial No.
N° de série: **HF**

BARCODE LABEL

US ENVIRONMENTAL PROTECTION AGENCY

Report #/Rapport #0135WS039E
Tested to / Testé à: UL 1482-2011, UL 737-2007, ULC-S627-00, EPA 28R ASTM E2780

THIS STOVE MEETS UL 737, STANDARD FOR FIREPLACE STOVES. WHEN FRESHSCREEN IS PROVIDED, APPROVED FOR USE IN MOBILE HOMES IN THE U.S. AND CANADA.

Install and use only in accordance with manufacturer's installation and operation instructions. Contact local building or fire officials about restrictions and installation inspection in your area. Install only with legs provided with installation instructions.

WARNING: Risk of flame and smoke spillage. Do not obstruct the space beneath the heater.

Fuel: Use with solid wood fuel only. Do not burn other fuels. Build a fire directly on hearth only. Do not elevate fire. Keep doors fully closed or fully open while operating.

Chimney: Use a minimum 6" diameter factory built high temperature (H.T.) chimney which is listed to UL-103-1985 (2100°F) or 8" X 8" nominal or larger approved masonry chimney with flue liner.

Do not connect this unit to a chimney flue serving another appliance.

Chimney Connector: Use a minimum 6" diameter 24 gauge chimney connector. Install chimney connector at least 18" from ceiling. Refer to local building codes and Vermont Castings Owner's Guide for precautions for passing a chimney or chimney connector through a combustible wall or ceiling.

Floor Protection U.S.: With the Vermont Castings Bottom Heat Shield installed most installations require an approved hearth pad. The Encore 2040 was test using a 1/2" (13mm) non-combustible hearth material with a thermal conductivity, (K) = 0.47 BTU-in/hr ft²-°F, resulting in the requirement of providing total thermal resistance (R) of 1.06. (Cover with material if desired). The floor protector is required under the stove and must extend 16" from the front, 6" from the rear and sides. It must extend under the chimney connector and 2" to either side. Without Vermont Castings Bottom Heat Shield, only installations over a totally non-combustible floor such as unpainted concrete over earth are acceptable. UL 737 Doors open require 1" floor protection.

Floor Protection Canada: Operate only with Vermont Castings Bottom Heat Shield in place. When installed on a combustible floor, the Encore 2040 was tested using a 1/2" (13mm) non-combustible hearth material with a thermal conductivity, (K) = 0.47 BTU-in/hr ft²-°F, resulting in the requirement of providing total thermal resistance (R) of 1.05. (Cover with decorative non-combustible material if desired). The floor protection must extend 450mm (18in.) to the front and 200mm (8in.) to the rear and 200mm (8in.) to the sides and rear. Do not obstruct the space under the heater.

Optional Components: Spark screen Part No. 0127 (only for use with 8" diameter connector and chimney), Flue Collar[®] oval Part No. 0555, Mobile Home Kit-0236, Fan Kit Part No. FK26; 115V 60Hz 1.1 FLA

Replace glass only with Vermont Castings 5mm ceramic glass.

Do not remove or cover this label. Catalytic Converter Part No. 30083353
CAUTION: Burning of materials other than the specified fuels may make the Catalyst in the combustor inactive. The combustor is fragile, handle carefully. The performance of the catalytic device or it's durability have not been evaluated as part of the certification.

Combustion air cannot be obstructed.

Damper must be open before opening doors. Do not overfire. Glowing parts indicate overfiring.

The space heater must be installed with the legs provided, attached as shown in the installation instructions.

Installer conformément aux instructions du fabricant. Contacter les autorités locales pour connaître les restrictions et inspections nécessaires. N'installer que les pattes qui sont incluses, en conformité avec les instructions du fabricant.

Ne pas obstruer l'espace sous le poêle.
Attention: Risque de flammes et de fumée spillage. Ne pas obstruer l'espace sous le chauffe-eau.

Le registre doit être ouvert avant d'ouvrir les portes.

Combustible: N'utiliser que du bois comme combustible. Ne pas utiliser d'autres types de combustible. Inspecter et nettoyer la cheminée fréquemment. Sous certaines usages, l'accumulation de crottes peut se produire rapidement. Garder les portes toutes fermées ou toutes ouvertes durant l'opération.

Faire le feu directement sur la grille prévue à cet effet. Laisser les portes du poêle soit complètement couverts ou complètement fermés lors de l'utilisation. Ne pas accorder le conduit de cheminée du poêle à une cheminée servant à d'autres appareils. N'utiliser que les vannes de céramique Vermont Castings en cas de remplacement de celles-ci.

Protection plancher Canada: fonctionner uniquement avec Vermont Castings écran thermique inférieure en place. Lorsqu'il est installé sur un plancher combustible, le Encore 2040 a été testé en utilisant un 1/2" (13mm) de matériau de être non-combustible avec une conductivité, (K) = 0,47 BTU-in / hr ft²-°F, ce qui entraîne l'obligation de providing résistance thermique totale (R) de 1,06. (Couvrir avec un matériau non-combustible, décorative si désiré). La protection de plancher doit se prolonger 450mm (18po.) à l'avant et 200 mm (8 po.) à l'arrière et 200 mm (8 po.) sur les côtés et à l'arrière. Ne pas obstruer l'espace sous le poêle.

Accessoires disponibles au Canada: écran pare feu 1937 (n'utiliser qu'avec un conduit d'évacuation et une cheminée de 6" de diamètre), ventilateur FK26, Catalyseur pièce no. 30083353

Remplacer uniquement qu'avec une glace 5mm Vermont Castings.

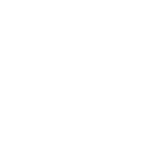
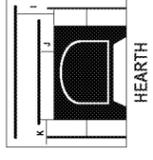
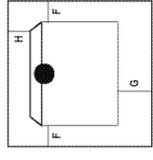
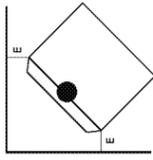
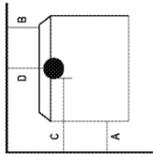
Attention: Brûler des matières autres que celles spécifiées pourrait rendre le catalyseur inactif.

Attention: Le catalyseur est fragile, manipuler avec soin.

CAUTION: HOT WHILE IN OPERATION - DO NOT TOUCH - KEEP CHILDREN AND CLOTHING AWAY - CONTACT MAY CAUSE SKIN BURNS - SEE NAMEPLATE AND INSTRUCTIONS. KEEP FURNISHINGS AND OTHER COMBUSTIBLE MATERIALS A CONSIDERABLE DISTANCE AWAY FROM THE APPLIANCE



ATTENTION: CHAUDS LORS DU FONCTIONNEMENT - NE TOUCHEZ PAS L'APPAREIL - GARDEZ LES ENFANTS ET LES VÊTEMENTS ÉLOIGNÉS - TOUT CONTACT PEUT ENTRAINER DES BRÛLURES DE LA PEAU. RÉFÉREZ-VOUS À LA PLAQUE SIGNALÉTIQUE ET AU MODE D'EMPLOI. GARDEZ LE MOBILIER ET LES AUTRES MATÉRIEAUX COMBUSTIBLES BIEN À L'ÉCART DE L'APPAREIL.



VERMONT CASTINGS

Made in U.S.A. of US and imported parts / Fabriqué aux États-Unis-Unités d'Amérique par des pièces d'origine américaine et pièces importées.

MINIMUM CLEARANCES TO COMBUSTIBLE CONSTRUCTION / MINIMUM DE DEGAGEMENT JUSQU'À LA CONSTRUCTION COMBUSTIBLE

A :: Unit to Backwall	19"	483mm
B :: Unit to Backwall	20"	508mm
C :: Chimney Connector to Backwall	29"	737mm
D :: Chimney Connector to Backwall	21"	534mm
E :: Unit to Adjacent Wall	18-1/2"	470mm
F :: Sides (Floor Protection)	6"	203mm
G :: Front to Glass (Floor Protection)	16"	407mm
H :: Rear (Floor Protection)	6"	203mm
I :: Top to Bottom of Mantel	22"	558mm
J :: Top to Bottom of Top Trim*	28"	712mm
K :: Edge of Top to Side Wall	21"	534mm

A :: Entre le mur latéral et l'appareil	483mm
B :: Entre le mur arrière et l'appareil	508mm
C :: Entre le tuyau et le mur latéral	737mm
D :: Entre le tuyau et le mur arrière	534mm
E :: Entre le mur adjoint et l'appareil	470mm
F :: Côtés (la protection de plancher)	203mm
G :: Devant, par rapport au verre	407mm
H :: Arrière (la protection de plancher)	203mm
I :: De haut en bas de Mantel	558mm
J :: De haut en bas de la moulure supérieure*	712mm
K :: Edge of Haut de paroi latérale	534mm



Date of Manufacture / Date de fabrication:
 2018 2019 2020 JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Manufactured by / Fabriqué par: Hearth and Home Technologies 352 Mountain House Road, Halifax, PA 17032

LABEL TICKET	
ECO:	LABEL SIZE: 6.5" H x 13.5" W
PART # / REV:	30007343_R1
ORIGINATOR:	Spidlet
DATE:	01/18
MATERIAL: 24 Gauge Aluminum INK: Black Background Aluminum Lettering	
(4) Slotted Holes = .156 x .25 (1) Round Hole = .630 (1) Round Hole = .140 (4) Corners = R.062	
Barcode label must have the serial number on it. The barcode label must be able to read Code 39 Full ASCII.	
352 Mountain House Road Halifax, PA 17032	

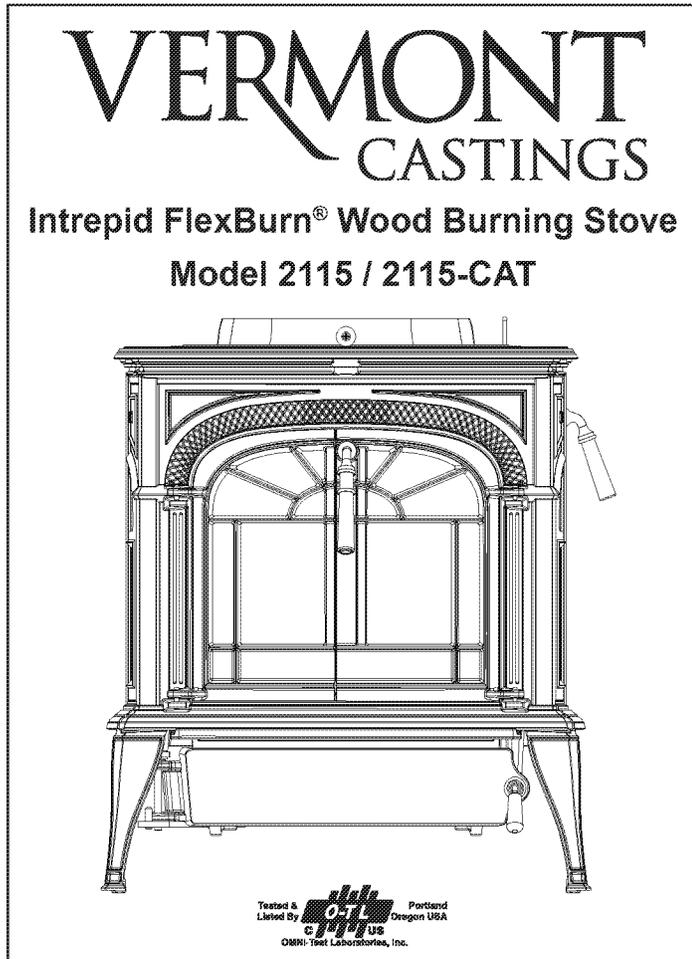
Owner's Manual

Operation & Care

INSTALLER: Leave this manual with party responsible for use and operation.

OWNER: Retain this manual for future reference.

Contact your dealer with questions on installation, operation, or service.



WARNING



Fire Risk

For use with solid wood fuel only.

Other fuels may over fire and generate poisonous gases (i.e. carbon monoxide).

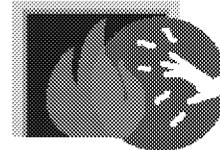
WARNING



If the information in these instructions is not followed exactly, a fire may result causing property damage, personal injury, or death.

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- Do not over fire - If appliance or chimney connector glows, you are over firing. Over firing will void your warranty.
- Comply with all minimum clearances to combustibles as specified. Failure to comply may cause house fire.

WARNING



HOT SURFACES!

Glass and other surfaces are hot during operation AND cool down.

Hot glass will cause burns.

- Do not touch glass until it is cooled
- NEVER allow children to touch glass
- Keep children away
- CAREFULLY SUPERVISE children in same room as fireplace.
- Alert children and adults to hazards of high temperatures
- **High temperatures may ignite clothing or other flammable materials.**
- Keep clothing, furniture, draperies and other flammable materials away.

NOTE

To obtain a French translation of this manual, please contact your dealer or visit www.vermontcastings.com

Pour obtenir une traduction française de ce manuel, s'il vous plaît contacter votre revendeur ou visitez www.vermontcastings.com

Installation and service of this appliance should be performed by qualified personnel. Hearth & Home Technologies recommends HHT Factory Trained or NFI certified professionals.



Congratulations on your choice of a Vermont Castings Intrepid FlexBurn® Wood Stove. At Vermont Castings we take American craftsmanship seriously. We assure you that your cast-iron Vermont Castings stove has been made with the utmost care and will provide you with many years of service.

As you become acquainted with your new stove, you will find that its appearance is matched by its functionality, due to cast iron's unique ability to absorb and radiate heat.

Also, Vermont Castings products are among the cleanest-burning wood stoves available today. However, clean burning depends on both the manufacturer and the operator. Please read this manual carefully to understand how to properly operate and maintain your stove.

At Vermont Castings, we are committed to your satisfaction as a customer. That is why we maintain an exclusive network of the finest dealers in the industry. Our dealers are chosen for their expertise and dedication to customer service. Feel free to contact your Authorized Vermont Castings Dealer anytime you have a particular question about your stove or its performance.

This manual contains valuable instructions on the operation of your Vermont Castings Intrepid FlexBurn® Wood Stove. It also contains useful information on maintenance. Please read the manual thoroughly and keep it as a reference.

This heater meets the U.S. Environmental Protection Agency's emission limits for wood heaters sold on or after May 15, 2020.

Please read this entire manual before you install and use your new stove. Failure to follow instructions may result in property damage, bodily injury, or even death.

Proposition 65 Warning: Fuels used in gas, wood burning or oil fired appliances, and the products of combustion of such fuels, contain chemicals known to the State of California to cause cancer, birth defects and other reproductive harm.
California Health & Safety Code Sec. 25249.6

MODEL / MODÈLE: "Intrepid II"

Approved for use in Mobile Homes - U.S. ONLY
Homologué pour les maisons mobiles - États-Unis uniquement

Report #/Rapport # 189280

Install and use only in accordance with manufacturer's installation and operation instructions.

Contact local building or fire officials about restrictions and installation in your area. Install only with legs provided or with optional short legs in accordance with installation instructions.

Fuel: Use with solid wood fuel only. Do not burn other fuels. Burn fire directly on grate. Keep doors fully closed or fully open while operating.

Chimney: Use a minimum 6" diameter factory built high temperature (T) chimney which is listed to UL-103-1985 (2100°F) or 8" nominal or larger approved masonry chimney with flue liner.

Do not connect this unit to a chimney flue serving another appliance.

Chimney Connector: Use a minimum 6" diameter 24 gauge chimney connector. Install chimney connector at least 18" from ceiling. Refer to local building codes and Vermont Castings Owner's Guide for procedures for passing a chimney or chimney connector through a combustible wall or ceiling.

Floor Protection, U.S.: With Vermont Castings Bottom Heat Shield (Part No. 0307), use a non-combustible floor protector such as 1/4" non-asbestos mineral board or equivalent or 24 gauge sheet metal. The floor protector must extend 16" from the front, 6" from the sides and rear. It must extend under chimney connector and 2" to either side, (covered with decorative non-combustible material if covered). Without Vermont Castings Bottom Heat Shield Kit, only installations over a totally non-combustible floor are acceptable, such as unpainted concrete over earth.

Floor Protection, Canada: With a Vermont Castings Bottom Heat Shield (Part No. 0307) in place. A non-combustible floor protector is required under the heater. The protector must extend 493mm (19") to the front and 255mm (10") to the sides and rear. Without Vermont Castings Bottom Heat Shield Kit, only installations over a totally non-combustible floor are acceptable such as unpainted concrete over earth.

Optional Components: Mobile Home Kit Part No. 3248.
U.S. and Canada: Refer to the Owner's Manual for the Screen Part No. 0136, Bottom Heat Shield Part No. 0307, Short Legs Part No. 0968, Catalytic Converter: Part No. 30005180.
Replace glass only with Vermont Castings ceramic glass.
Do not remove or cover this label.

Serial No. HF

Model Name Intrepid II

Test Lab & Report No. 3-90-1801284_RR

Mfg. Date 2018

THE INTREPID II MEETS JUL 737, STANDARD FOR FIREPLACE STOVES, WHEN A FIRESCREEN IS PROVIDED.

MINIMUM CLEARANCES TO COMBUSTIBLE CONSTRUCTION
MINIMUM DE DÉGAGEMENT BIEN QUE LA CONSTRUCTION COMBUSTIBLE

	US	Canada
A	30"	760mm
B	26"	660mm
C	24"	610mm
D	24"	610mm
E	20"	510mm
F	16"	405mm
G	15"	381mm
H	15"	381mm
I	15"	381mm
J	24"	610mm
K	24"	610mm

Caution: Burning of metal foil, coal, plastic and garbage, and/or diesel oil will make the catalytic converter ineffective. **The combustor is fragile.** Handle carefully. The performance or durability of the combustor have not been evaluated as part of this listing.

Do not overfire - If heater or chimney connector glows, you are overfiring.

Inspect and clean chimney frequently - under certain conditions of use, creosote buildup may occur rapidly. Do not use grain or sawdust fire - wood should not directly on hearth.

Veillez à n'installer et à n'utiliser votre poêle et à n'employer que les pellets ou le solide feu autorisés par le fabricant, conformément aux directives de celui-ci.

Installez soigneusement avec les pellets brulées ou les pellets courtes cylindrique et co, en conformité avec les instructions du fabricant.

Combustibles: Ne s'empilez qu'avec du bois à l'exclusion de tous autres combustibles. Préparez votre feu sur le grêle. Veillez à ce que les pellets soient ouvertes en grand ou bien fermées pendant le fonctionnement.

Ne remplissez les vitres qu'avec le verre céramique Vermont Castings.

Protection Plancher, Canada: N'employez que l'Intrepid II qu'avec le déflecteur de chaleur du fond Vermont Castings "N" de pièce 0307. Lorsqu'installé sur un plancher combustible, une protection non-combustible est requise sous l'appareil. Cette protection doit couvrir une surface allant à 460mm devant et 255mm à l'arrière et sur les côtés. Ne pas enlever la protection sous le poêle.

Composants facultatifs: Le kit de protection du sol "N" de pièce 0172. Placez attentivement le déflecteur de chaleur.

Catalyseur de combustion: Le brûleur de papier métallique est fragile et sensible à la chaleur, au soufre et au diesel provenant de l'huile ou du catalyseur. Ce convertisseur est fragile, manipulez avec précaution. L'évaluation du rendement du catalyseur de combustion du convertisseur n'est pas incluse dans les instructions d'installation.

U.S. ENVIRONMENTAL PROTECTION AGENCY
This heater meets the 2015 particulate emission standards at 15% duty cycle. Not approved for sale after May 15, 2020. This wood heater contains a catalytic combustor which needs periodic inspection and replacement for proper operation. Consult the Owner's Manual for further information. It is against Federal Regulations to operate this wood heater in a manner inconsistent with operating instructions in the Owner's Manual, or if the catalytic element is deactivated or removed. Do not remove or cover this label.

VERMONT CASTINGS

Made in U.S.A. of US and imported parts. / Fabriqué aux États-Unis-d'Amérique par des pièces d'origine américaine et pièces importées.

CAUTION: HOT WHILE IN OPERATION- DO NOT TOUCH-KEEP CHILDREN AND CLOTHING AWAY- CONTACT MAY CAUSE SKIN BURNS- SEE NAMEPLATE AND INSTRUCTIONS. KEEP FURNISHINGS AND OTHER COMBUSTIBLE MATERIALS A CONSIDERABLE DISTANCE AWAY FROM THE APPLIANCE

ATTENTION: CHAUD LORS DU FONCTIONNEMENT- NE TOUCHEZ PAS L'APPAREIL- GARDEZ LES ENFANTS ET LES VÊTEMENTS ÉLOIGNÉS- TOUT CONTACT PEUT ENTRAÎNER DES BRÛLURES DE LA PEAU. RÉFÉREZ-VOUS À LA PLAQUE SIGNALÉTIQUE ET AU MODE D'EMPLOI. GARDEZ LE MOBILIER ET LES AUTRES MATÉRIEAUX COMBUSTIBLES BIEN À L'ÉCART DE L'APPAREIL.

2 Vermont Castings • Intrepid FlexBurn® Owner's Manual_Draft • 2018 - ____ • 06/18 3-90-3000345c

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⚠ Safety Alert Key:

- **DANGER!** Indicates a hazardous situation which, if not avoided will result in death or serious injury.
 - **WARNING!** Indicates a hazardous situation which, if not avoided could result in death or serious injury.
 - **CAUTION!** Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
 - **NOTICE:** Indicates practices which may cause damage to the appliance or to property.
-

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➔ = Contains updated information

A. Warranty Policy

Hearth & Home Technologies LIMITED LIFETIME WARRANTY

Hearth & Home Technologies, on behalf of its hearth brands ("HHT"), extends the following warranty for HHT gas, wood, pellet and electric hearth appliances that are purchased from an HHT authorized dealer.

WARRANTY COVERAGE:

HHT warrants to the original owner of the HHT appliance at the site of installation, and to any transferee taking ownership of the appliance at the site of installation within two years following the date of original purchase, that the HHT appliance will be free from defects in materials and workmanship at the time of manufacture. After installation, if covered components manufactured by HHT are found to be defective in materials or workmanship during the applicable warranty period, HHT will, at its option, repair or replace the covered components. HHT, at its own discretion, may fully discharge all of its obligations under such warranties by replacing the product itself or refunding the verified purchase price of the product itself. The maximum amount recoverable under this warranty is limited to the purchase price of the product. This warranty is subject to conditions, exclusions and limitations as described below.

WARRANTY PERIOD:

Warranty coverage for consumers begins at the date of installation. In the case of new home construction, warranty coverage begins on the date of first occupancy of the dwelling or six months after the sale of the product by an independent, authorized HHT dealer/distributor, whichever occurs earlier. However, the warranty shall commence no later than 24 months following the date of product shipment from HHT, regardless of the installation or occupancy date. The warranty period for parts and labor for covered components is produced in the following table.

The term "Limited Lifetime" in the table below is defined as: 20 years from the beginning date of warranty coverage for gas appliances, and 10 years from the beginning date of warranty coverage for wood and pellet appliances. These time periods reflect the minimum expected useful lives of the designated components under normal operating conditions.

Warranty Period		HHT Manufactured Appliances and Venting					
Parts	Labor	Gas	Pellet	Wood	Electric	Venting	Components Covered
1 Year		X	X	X	X	x	All parts and material except as covered by Conditions, Exclusions, and Limitations listed
2 years			X	X			Igniters, auger motors, electronic components, and glass
		X	X	X			Factory-installed blowers
				X			Molded refractory panels
		X					Ignition Modules
3 years			X				Firepots, burnpots, mechanical feeders/auger assemblies
5 years	1 year	X					Vent Free burners, Vent Free ceramic fiber logs, Aluminized Burners
			X	X			Castings and Baffles
6 years	3 years			X			Catalyst - limitations listed
7 years	3 years		X	X			Manifold tubes, HHT chimney and termination
10 years	1 year	X					Burners, logs and refractory
Limited Lifetime	3 years	X	X	X			Firebox and heat exchanger, Grate and Stainless Steel Burners, FlexBurn® System (engine, inner cover, access cover and fireback)
90 Days		X	X	X	X	X	All replacement parts beyond warranty period

WARRANTY CONDITIONS:

- This warranty only covers HHT appliances that are purchased through an HHT authorized dealer or distributor. A list of HHT authorized dealers is available on the HHT branded websites.
- This warranty is only valid while the HHT appliance remains at the site of original installation.
- This warranty is only valid in the country in which the HHT authorized dealer or distributor that sold the appliance resides.
- Contact your installing dealer for warranty service. If the installing dealer or distributor is unable to provide necessary parts, contact the nearest HHT authorized dealer or supplier. Additional service fees may apply if you are seeking warranty service from a dealer other than the dealer from whom you originally purchased the product.
- Check with your dealer in advance for any costs to you when arranging a warranty call. Travel and shipping charges for parts are not covered by this warranty.
- Limited Catalyst Warranty
 - For wood burning products containing a catalyst, the catalyst will be warranted for a six-year period as follows: if the original catalyst or a replacement catalyst proves defective or ceases to maintain 70% of its particulate emission reduction activity (as measured by an approved testing procedure) within 36 months from the purchase date, the catalyst will be replaced for free.
 - From 37 to 72 months a pro-rated credit will be allowed against a replacement catalyst and labor credit necessary to install the replacement catalyst. The proration rate is as follows:

Amount of Time Since Purchase	Credit Towards Replacement Cost
0 - 36 Months	100%
37 - 48 Months	30%
49 - 60 Months	20%
61 - 72 Months	10%

- Any replacement catalyst will be warranted under the terms of the catalyst warranty for the remaining term of the original warranty. The purchaser must provide the name, address, and telephone number of the location where the product is installed, proof of original purchase date, date of failure, and any relevant information regarding the failure of the catalyst.

WARRANTY EXCLUSIONS:

This warranty does not cover the following:

- Changes in surface finishes as a result of normal use. As a heating appliance, some changes in color of interior and exterior surface finishes may occur. This is not a flaw and is not covered under warranty.
- Damage to printed, plated, or enameled surfaces caused by fingerprints, accidents, misuse, scratches, melted items, or other external sources and residues left on the plated surfaces from the use of abrasive cleaners or polishes.
- Repair or replacement of parts that are subject to normal wear and tear during the warranty period are not covered. These parts include: paint, wood and pellet gaskets, firebricks, grates, flame guides, batteries and the discoloration of glass.
- Minor expansion, contraction, or movement of certain parts causing noise. These conditions are normal and complaints related to this noise are not covered by this warranty.
- Damages resulting from: (1) failure to install, operate, or maintain the appliance in accordance with the installation instructions, operating instructions, and listing agent identification label furnished with the appliance; (2) failure to install the appliance in accordance with local building codes; (3) shipping or improper handling; (4) improper operation, abuse, misuse, continued operation with damaged, corroded or failed components, accident, or improperly/incorrectly performed repairs (5) environmental conditions, inadequate ventilation, negative pressure, or drafting caused by tightly sealed constructions, insufficient make-up air supply, or handling devices such as exhaust fans or forced air furnaces or other such causes; (6) use of fuels other than those specified in the operation instructions; (7) installation or use of components not supplied with the appliance or any other components not expressly authorized and approved by HHT; (8) modification of the appliance not expressly authorized and approved by HHT in writing; and/or (9) interruptions or fluctuations of electrical power supply to the appliance.
- Non-HHT venting components, hearth connections or other accessories used in conjunction with the appliance.
- Any part of a pre-existing fireplace system in which an insert or a decorative gas appliance is installed.
- HHT's obligation under this warranty does not extend to the appliance's capability to heat the desired space. Information is provided to assist the consumer and the dealer in selecting the proper appliance for the application. Consideration must be given to the appliance location and configuration, environmental conditions, insulation and air tightness of the structure.

This warranty is void if:

- The appliance has been over-fired, operated in atmospheres contaminated by chlorine, fluorine, or other damaging chemicals. Over-firing can be identified by, but not limited to, warped plates or tubes, deformation/warping of interior cast iron structure or components, rust colored cast iron, bubbling, cracking and discoloration of steel or enamel finishes.
- The appliance is subjected to prolonged periods of dampness or condensation.
- There is any damage to the appliance or other components due to water or weather damage which is the result of, but not limited to, improper chimney or venting installation.

LIMITATIONS OF LIABILITY

- The owner's exclusive remedy and HHT's sole obligation under this warranty, under any other warranty, express or implied, or in contract, tort or otherwise, shall be limited to replacement, repair, or refund, as specified above. In no event will HHT be liable for any incidental or consequential damages caused by defects in the appliance. Some states do not allow exclusions or limitation of incidental or consequential damages, so these limitations may not apply to you. This warranty gives you specific rights; you may also have other rights, which vary from state to state. EXCEPT TO THE EXTENT PROVIDED BY LAW, HHT MAKES NO EXPRESS WARRANTIES OTHER THAN THE WARRANTY SPECIFIED HEREIN. THE DURATION OF ANY IMPLIED WARRANTY IS LIMITED TO DURATION OF THE EXPRESSED WARRANTY SPECIFIED ABOVE.

1 Listing and Code Approvals

A. Appliance Certification

MODEL:	Intrepid FlexBurn® Wood Stove
LABORATORY:	OMNI Test Laboratories, Inc
REPORT NO.	0135WS038
TYPE:	Solid Fuel Type Room Heaters
STANDARD(s):	UL-1482, ULC-S627, UL737

B. BTU & Efficiency Specifications

EPA Certification #:	0135WS0385
EPA Certified Emissions:	.6g/hr (without catalyst) .3 g/hr (catalytic)
*LHV Tested Efficiency:	80.3% (without catalyst) 76.7% (catalytic)
**HHV Tested Efficiency:	74.3% (without catalyst) 76.7% (catalytic)
***EPA BTU Output:	13,039 - 17,847 (without catalyst) 14,544 - 15,900 (catalytic)
****Peak BTU/Hour Output:	36,900 (without catalyst) 34,900 (catalytic)
Vent Size:	6 Inch (152 mm)
Firebox Size:	1.3 cu. ft.
Max. Wood Length:	16" Maximum
Fuel Orientation:	East, West
Fuel	Seasoned Cordwood (20% moisture)
* Weighted average LHV efficiency using Douglas Fir dimensional lumber and data collected during EPA emissions test.	
**Weighted average HHV efficiency using Douglas Fir dimensional lumber and data collected during EPA emissions test.	
***Efficiencies are based on test results calculated using B415; these calculated efficiencies are then used to calculate output BTU's.	
****A peak BTU out of the appliance calculated using the maximum first hour burn rate from the High EPA Test and the BTU content of cord wood (8600) times the efficiency.	

The Vermont Castings Intrepid FlexBurn® Wood Appliance meets the U.S. Environmental Protection Agency's crib wood emission limits for wood appliances sold after May 15, 2020.

This wood appliance needs periodic inspection and repair for proper operation. It is against federal regulations to operate this wood appliance in a manner inconsistent with operating instructions in this manual.

C. Mobile Home Approved (USA ONLY)

- This appliance is approved for mobile home installations in the USA when not installed in a sleeping room and when an outside combustion air inlet is provided.
- The structural integrity of the mobile home floor, ceiling, and walls must be maintained.
- The appliance must be properly grounded to the frame of the mobile home with #8 copper ground wire, and chimney must be listed to UL103 HT or a listed UL-1777 full length six inch (152mm) diameter liner must be used.
- Outside Air Kit, part 0003265 must be installed in a mobile home installation.

D. Glass Specifications

This appliance is equipped with 5mm ceramic glass. Replace glass only with 5mm ceramic glass. Please contact your dealer for replacement glass.

 WARNING	
	Fire Risk. Hearth & Home Technologies disclaims any responsibility for, and the warranty will be voided by, the following actions:
	<ul style="list-style-type: none"> • Installation and use of any damaged appliance. • Modification of the appliance. • Installation other than as instructed by Hearth & Home Technologies. • Installation and/or use of any component part not approved by Hearth & Home Technologies. • Operating appliance without fully assembling all components. • Operating appliance without legs attached (if supplied with appliance). • Do NOT Overfire - If appliance or chimney connector glows, you are overfiring. <p>Any such action that may cause a fire hazard.</p>

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. For assistance or additional information, consult a qualified installer, service agency or your dealer.

NOTE: Hearth & Home Technologies, manufacturer of this appliance, reserves the right to alter its products, their specifications and/or price without notice.

Vermont Castings is a registered trademark of Hearth & Home Technologies.

2 Operating Instructions

A. The Intrepid FlexBurn® Controls

Two controls regulate the performance of the Intrepid FlexBurn®: a **primary air control** supplies oxygen for the fire, and a **damper** directs air flow within the stove to activate and deactivate the combustion system. (Figure 2.1)

Symbols on the stove are reminders of the correct directions for using the controls. The words 'Left' and 'right' in these directions are *facing the stove*.

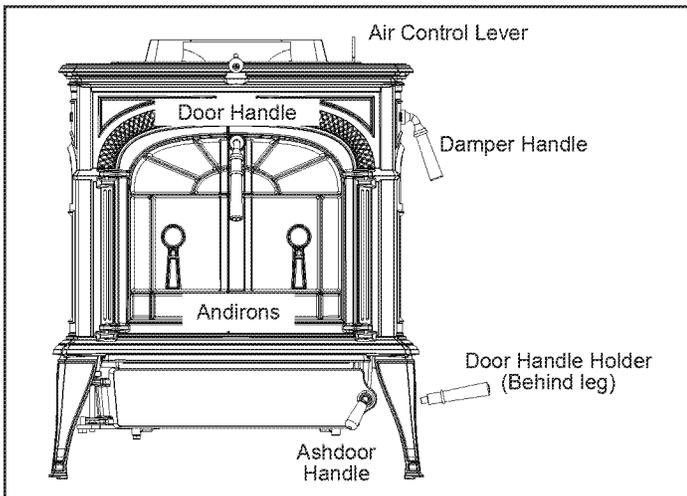


Figure 2.1 - The Intrepid FlexBurn® controls are conveniently located and easy to operate.

A Single Air Control Regulates Heat Output and Burn Time

The **primary air control lever**, on the top-right of the stove, controls the amount of incoming air for starting, maintaining, and reviving a fire.

Once the air control is manually set, a bi-metallic thermostat automatically maintains the heat output at a constant level for a more even heat over the life of the burn.

More air entering the stove makes the fire burn hotter and faster, while less air prolongs the burn at a lower heat output level.

For the greatest air supply and maximum heat output (but the shortest burn time), move the lever toward the flue collar. For a fire that will last longer with less heat, move the lever away from the flue collar. (Figure 2.2)

WARNING

This wood heater has a manufactured-set minimum low burn rate that must not be altered. It is against federal regulations to alter this setting or otherwise operate this wood heater in a manner inconsistent with operating instructions in this manual.

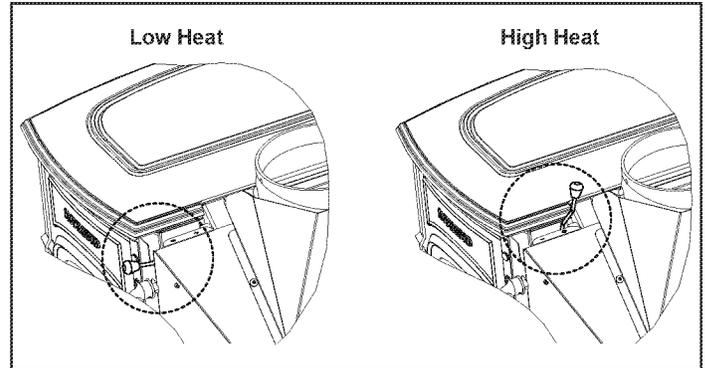


Figure 2.2 - The handle may be positioned anywhere between the two extremes for different heat levels.

A Damper Directs Air Flow Within the Stove

The **damper handle** on the right side of the stove operates the damper to direct air flow within the stove.

The damper is **open** when the handle points **down**, enabling smoke to pass directly into the chimney. The damper must be open when starting or reviving a fire, and always when the griddle or doors are opened.

The damper is **closed** when the handle points **forward**. Smoke travels through the secondary combustion system where it can be further burned, before passing up the chimney. (Figure 2.3)

The damper should always be either fully open or fully closed. There are no intermediate positions. When closing the damper, be sure to pull firmly enough to snap the handle into the locked position.

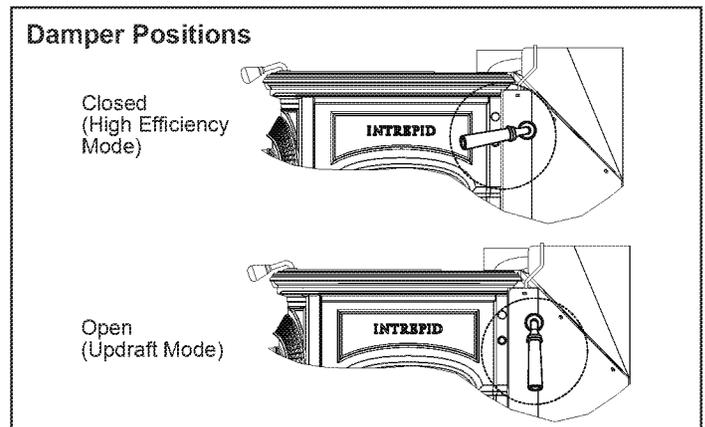


Figure 2.3 - The damper is either open or closed. There are no intermediate positions.

B. Conditioning Your Stove

Cast iron is extremely strong, but it can be broken with a sharp blow from a hammer or from the thermal shock of rapid and extreme temperature change.

The cast plates expand and contract with changes in temperature. When you first begin using your Intrepid FlexBurn®, minimize thermal stress by letting the plates adjust gradually during three or four initial break-in fires following Steps 1-3 below.

Wood Burning Operation

Burn only solid wood in the Intrepid FlexBurn® Wood Stove, and burn it directly on the grate. Do not elevate the fuel. Do not burn coal or other fuels. In the United States, it is against the law to operate this wood heater in a manner inconsistent with operating instructions in this manual.

The bypass damper must be open when starting a fire or when refueling.

Do not use chemicals or fluids to start the fire. Do not burn garbage. Never use flammable fluids such as gasoline, gasoline type lantern fuel, kerosene, charcoal lighter fluid, naphtha, engine oil or similar liquids to start or “freshen up” a fire in this heater. Keep all such liquids well away from the heater while it is in use.

1. Open the stove bypass damper, and open the primary air control fully.
2. Place several sheets of crumpled newspaper in the stove. Place six or eight pieces of dry kindling split to a finger-width size on the paper. On the kindling, lay two or three larger sticks of split dry wood approximately 1-2" (25-51 mm) in diameter. (Figure 2.4)

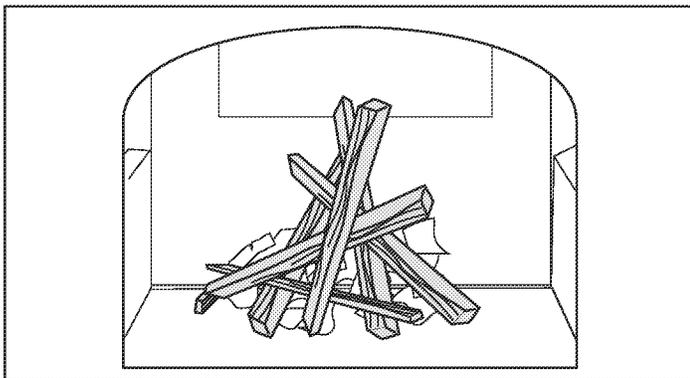


Figure 2.4 - Start the fire with newspaper and dry kindling.

3. Light the newspaper and close the door. Gradually build up the fire by adding a few 3-5" (80-120 mm) diameter pieces of split firewood. **If this is one of the first few “break-in” fires, let the fire burn brightly, and then let it die out.** During the break-in fires, do not let the stove get hotter than 500°F. (260°C) as measured on an optional stove-top thermometer. Adjust the air control lever as necessary to control the fire. Some odor from the stove's hot metal and the paint is normal for the first few fires.

NOTE: Some chimneys must be “primed,” or warmed up, before they will draw sufficiently to start a fire. To correct this situation, roll up a couple pieces of newspaper, place them on top of the kindling and toward the back of the stove, light them, and close the doors. This will encourage the smoke to rise rapidly, making it easier to establish a good draft. Once the draft is established, open the front door and light the rest of the fuel from the bottom. Do not light the main bed of fuel until the chimney begins drawing, and repeat the procedure as often as necessary if the initial attempt is unsuccessful.

NOTE: Effectiveness of a “top-down” method to start a fire. Smoke emissions when starting a fire can be difficult to control because the stove is not yet heated to its optimum temperature. One method of reducing emissions during a cold start-up is the use of a “top-down” kindling procedure. In this, place larger pieces of kindling on the bottom of the kindling pile followed by smaller and smaller pieces as the pile is added to. Very finely split pieces should be on the top. Light the kindling pile with a match at the top and allow the kindling to burn downward into the larger pieces. This reduces smoke by slowly increasing the fire size without creating an air-starved condition.

4. **If your Intrepid FlexBurn® has been broken-in previously** using Steps 1-3, continue to build the fire gradually. Add larger wood with a diameter of 3-4" (75-100 mm). Continue adding split logs of this size to the briskly-burning fire until there is a glowing ember bed 2-3" (51-75 mm) deep. (Figure 38) A good ember bed is necessary for proper functioning of the combustion system.
5. Close the damper when the griddle temperature reaches 450°F (230°C) and sufficient ember bed is established. This will force the smoke into the secondary combustion chamber where the smoke and gases will ignite if the stove is sufficiently hot. Even though it is possible for the fire to get quite hot within a few minutes after a fire is started, secondary combustion may stop or the fire may go out if the fire dies down immediately as a result of the damper being closed too early.
6. Adjust the air control for your desired heat output.

NOTE: Stove installations vary widely, and the operating guidance given here is only a starting point. This manual will explain in detail how the features of your installation may help or hinder good draft, and how you may need to vary your firing technique if your installation doesn't encourage a good draft.

High-Efficiency Wood Burning with the Catalytic Combustor
Your Intrepid FlexBurn® has an optional catalytic combustor available as an accessory. When operating the stove with the catalytic combustor, use the same operation instructions as outlined in the previous section.

While not required, operating your stove with the catalytic combustor installed creates optimum conditions for secondary combustion and will increase your efficiency up to 15% on low burn, making sure you get the most heat out of each load of wood.

The catalytic element is a ceramic "honeycomb" coated with the catalytic material. The element sits at the bottom of the secondary combustion chamber. Smoke, gases and particulates that are not fully combusted during the secondary combustion process pass through the catalyst, creating a tertiary burn. This results in higher efficiency and lower emissions.

The catalyst will initiate combustion of smoke and particulates at 500° - 600°F (260° - 315°C), half the temperature normally required for unaided secondary combustion. If you followed the startup operation steps in the previous section the stove will be sufficiently hot to allow the combustor to work. Once the combustor starts working, heat generated by burning the smoke will keep it working.

To determine whether the combustor is operating, refer to the temperature probe which shows the operating range of the catalytic combustor. This is located on the back of the stove and is viewed from the top. **NOTE:** It will take several minutes after closing the bypass damper for the temperature probe to fully adjust to the new temperature. If the probe indicator is below the operate catalyst range when the bypass damper is closed, add fuel or open the bypass damper to allow the fire to further build before engaging the catalyst again.

If the probe indicator is above the operate catalyst range, the catalytic combustor is running too hot and may be damaged. In many cases, decreasing the primary air can reduce the catalyst temperature and adding less wood with each loading can also help if overheating is persistent. Do not add wood to the stove if the probe reads above the operate catalyst range.

Avoid using a full load of very dry wood in the firebox, such as dry slab wood or wood with below 14% moisture content. This may result in continuous very high temperatures in the secondary combustion area and damage the combustor.

Never burn treated wood, garbage, solvents or trash. All of these may poison the catalyst and prevent it from operating properly. Never burn cardboard or loose paper except for kindling purposes. Never burn coal; doing so can produce soot or large flakes of char or fly ash that can coat the combustor and cause smoke to spill into the room. Coal smoke can also poison the catalyst so that it won't operate properly.

C. Ways to Add Fuel

The Intrepid FlexBurn's griddle lifts for convenient top-loading of logs, and is the easiest way to add fuel. (Figure 2.5)

However, the front doors open as well for adding an occasional log to a fire. If the Optional Spark Screen is purchased, the front doors may be opened (or even removed) and the optional Spark Screen placed in the opening for open-fire viewing. The Intrepid FlexBurn® Wood Stove is not approved for operation with the front doors open if the Optional Spark Screen is not installed.

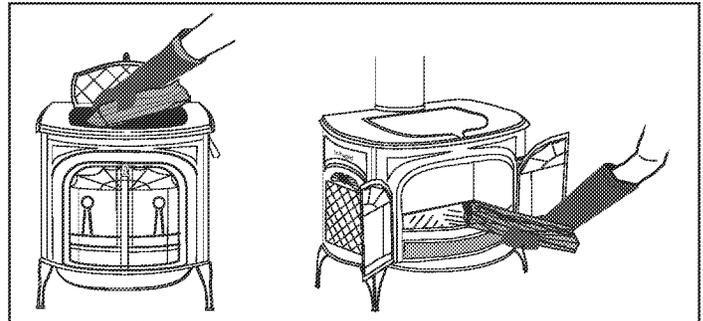


Figure 2.5 - Top loading is the best way to add fuel during regular use. Front loading is useful for kindling a fire.

To open the front doors, insert the handle into the door latch stub and turn it clockwise. (Figure 2.6)

To close them, always close the left door first. Turn the handle in the right door to the left and up (to the open position) and close it. Finally, push on the door as you turn the handle counterclockwise. The doors will draw in slightly, and the handle should offer some resistance as you turn it to the closed position.

To reduce the risk of breaking the glass, avoid striking the glass or slamming the doors.

When you are not using the door handle, store it in the holder behind the right front leg of the stove.

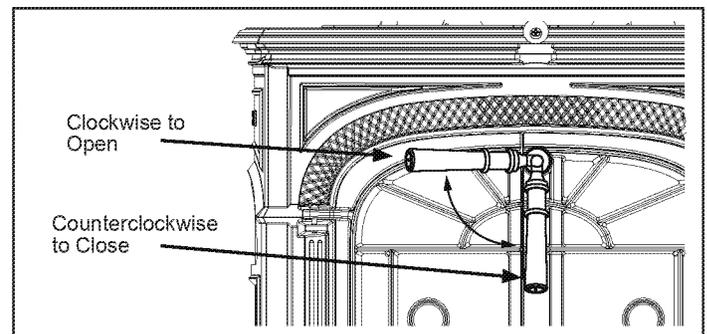


Figure 2.6 - To open the front doors, turn the handle clockwise.

WARNING

Fireplace stoves equipped with doors should be operated only with doors fully open or doors fully closed. If doors are left partly open, gas and flame may be drawn out of the fireplace stove opening, creating risks from both fire and smoke.

WARNING

For safety and greatest efficiency, operate your stove only with all doors/griddles fully closed. The test standard for your stove when it is operated in this mode is UL 1482.

Refuel While the Embers Are Still Hot

When reloading, best results will be achieved if you first de-ash the stove by stirring the fuel bed to allow ash to fall through the grate into the ash pan.

Do not break the charcoal into very small pieces or pound or compress the charcoal bed. Check to make sure air holes at the bottom of the fireback are not blocked by ash or embers (blockage will reduce performance of the stove).

It is important that air can circulate through the charcoal bed during the burn. Larger pieces of charcoal allow more air to circulate under the wood, resulting in the fire reviving more quickly. (Figure 2.7)

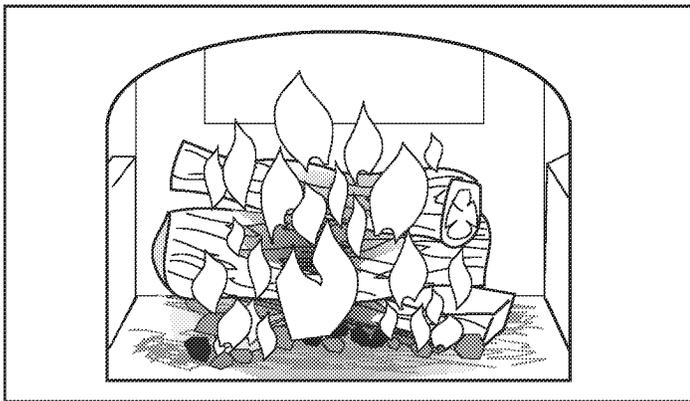


Figure 2.7 - Add full size logs after the ember bed is 3" (75mm) deep.

For best results when refueling, wear long-cuffed stove gloves to protect your hands and forearms. Add fuel while the stove still has plenty of glowing embers to re-ignite the fire and include some smaller pieces of wood in the new fuel load to help the stove regain its operating temperature quickly. Use this sequence as a guide to successful refueling:

1. Open the damper.
2. De-ash the stove as described above. Open the ash door and check the level of ash in the ash pan. Empty the pan if necessary and replace it in the stove. Close the ash door.
3. Open the griddle top, load the wood (smaller pieces first), and close the griddle top.
4. Wait several minutes for the new wood to fully ignite and for the stove top surface temperature to reach 450°F (230°C).
5. Close the damper. And adjust the air control for the amount of heat your desire.

NOTE: If the remaining charcoal bed is relatively thick (2-3" / 51-75 mm) and if your fuel is well seasoned, it is possible to add fresh fuel (smaller pieces first), close the door and damper, and reset the primary air control for the desired heat output within five minutes.

WARNING

DO NOT OPERATE THE STOVE WITH THE ASH DOOR OPEN. OPERATION WITH THE ASH DOOR OPEN CAN CAUSE AN OVER-FIRING CONDITION TO OCCUR. OVER-FIRING THE STOVE IS DANGEROUS AND CAN RESULT IN PROPERTY DAMAGE, INJURY OR LOSS OF LIFE.

Andirons Help Protect the Glass

Your stove has andirons to keep logs away from the glass panels. The andirons are essential to maintain clear fire viewing, and should be left in place. Since the andirons may slightly hinder refueling through the front doors, most stove owners will prefer the convenience of top loading through the griddle. Do not place fuel between the andirons and the doors.

Burn Only High-Quality Wood

The Intrepid FlexBurn® is designed to burn natural wood only; do not burn fuels other than that for which it was designed.

IMPORTANT: Do not burn any type of artificial or synthetic materials such as fire starter logs (containing wax) in this appliance. Never burn liquid-based fuels such as kerosene, gasoline or alcohol.

Burning any materials not allowed in these instructions, or over-firing the stove, may void the warranty.

You'll enjoy the best results when burning wood that has been adequately air-dried. The wood should be 14" - 16" (356-406 mm) in length. Avoid burning "green" wood that has not been properly seasoned. Do not burn construction materials; they often contain chemicals and metals that can damage the inside surfaces of the stove and pollute the air. Do not burn ocean driftwood; when it burns, the salt it contains will attack the cast iron.

The best hardwood fuels include oak, maple, beech, ash, and hickory that has been split, stacked, and air-dried outside under cover for at least one year.

If hardwood is not available, you can burn softwoods that include tamarack, yellow pine, white pine, Eastern red cedar, fir, and redwood. These should also be properly dried.

Store split wood under cover to keep it dry. Even for short-term storage, be sure to keep wood a safe distance from the stove and keep it out of the areas around the stove used for refueling and ash removal.

Surface Thermometer is a Valuable Guide to Operation

An optional surface thermometer tells you when to adjust the air control, and when to refuel. (Figure 2.8)

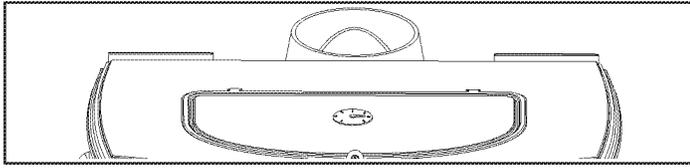


Figure 2.8 - Take temperature readings with a thermometer located in the middle of the griddle.

For example, when the thermometer registers at least 450°F (230°C) on the stove top after start-up you know the stove is hot enough and it may be time to close the damper if a sufficient ember bed has also been established. Note that the stove will warm up much sooner than the chimney, though; a warm chimney is the key to easy, effective stove operation. When thermometer readings drop below 350°F. (175°C) it's time to adjust the air control for a higher burn rate or to reload the stove. A temperature reading over 650°F. (340°C) is a sign to reduce the air supply to slow the burn rate.

Use the following temperature ranges as a guide:

- Readings in the 350°-500°F. (175°-260°C) range indicate low to medium heat output.
- 500°-600°F. (260°-315°C) readings indicate medium heat output.
- Readings of 600°-650°F. (315-340°C) indicate high heat output. Operating your Intrepid FlexBurn® continuously at griddle temperatures higher than 650° F (340°C) may damage the cast iron or enamel finish.

Use the Air Control Settings that Work Best for You

No single air control setting will fit every situation. Each installation will differ depending on the quality of the fuel, the amount of heat desired, and how long you wish the fire to burn; outdoor air temperature and pressure also affect draft.

The control setting also depends on your particular installation's "draft," or the force that moves air from the stove up through the chimney. Draft is affected by such things as the length, type, and location of the chimney, local geography, nearby obstructions, and other factors.

Too much draft may cause excessive temperatures in the Intrepid FlexBurn®, and could even damage the stove. On the other hand, too little draft can cause backpuffing into the room and/or the "plugging" of the chimney.

How do you know if your draft is excessively high or low? Symptoms of too much draft include an uncontrollable burn or a glowing-red stove part. Signs of weak draft are smoke leaking into the room through the stove or chimney connector joints or low heat output.

In some newer homes that are well-insulated and weather-tight, poor draft may result from an insufficient air supply in the house. In such instances, an open window near the stove on the windward side of the house can provide the combustion air supply needed.

Another option for getting more combustion air to the stove is to duct air directly from outside to the stove. In some areas provisions for outside combustion air are required in all new construction.

The Intrepid FlexBurn® is equipped to deliver outside air for combustion with outside air kit #0003265.

When first using the stove, keep track of the air control settings. You will quickly find that a specific setting will give you a fixed amount of heat. It may take a week or two to determine the amount of heat and the length of burn you should expect from various settings.

Most installations do not require a large amount of combustion air, especially if adequate draft is available. Do not for any reason attempt to increase the firing of your heater by altering the air control adjustment range outlined in these directions.

D. Used as a Fireplace

Use only the Intrepid FlexBurn® spark screen, Item #0003262, with your Intrepid FlexBurn® Wood Stove.

Intrepid FlexBurn® SPARK SCREENS ARE AVAILABLE FROM YOUR VERMONT CASTINGS DEALER.

E. Ash Disposal

(Refer to the first page of the Operation section.)

DO NOT OPERATE THE STOVE WITH THE ASH DOOR OPEN. OPERATION WITH THE ASH DOOR OPEN CAN CAUSE AN OVER-FIRING CONDITION TO OCCUR. OVER-FIRING THE STOVE IS DANGEROUS AND CAN RESULT IN PROPERTY DAMAGE, INJURY OR LOSS OF LIFE.

Routine ash removal is important for ease of maintenance, and is important for the stove's durability. Remove ash before it reaches the top of the ash pan. Check the level at least once a day. Every few days, clear any ash from the outer edges of the firebox. Most of the ash will fall through the grate. Stir the ash with a shovel or poker so that it falls through the grate slots.

IMPORTANT: Check the level of ash in the ash pan before reloading the stove. If the ash level is close to the top edge of the pan, empty the pan according to this procedure:

- Open the damper.
- Open the griddle or front doors, and use a shovel or poker to stir excess ash through the ash slots in the grate down into the ash pan.
- Close the griddle or doors, and unlatch the ash door. (Figure 2.9) It will pivot, swinging the ash pan out of the stove.

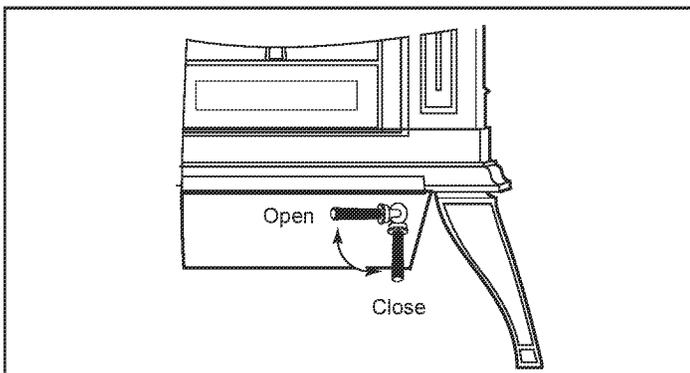


Figure 2.9- Turn the ashdoor handle clockwise to open and counterclockwise to close.

- Slide the cover onto the pan, making sure it is securely closed. (Figure 2.10)

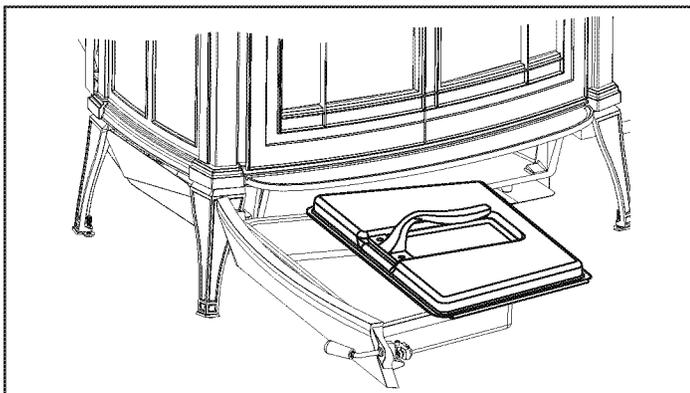


Figure 2.10 - Be sure the cover is securely attached before removing the ash pan.

- Remove the ash pan, making sure to keep it level.
- To keep the cover from sliding off and to keep ash from falling on the floor, do not tilt the ash pan forward.
- If the stove is in operation, close the ash door while disposing of the ash. You may need to lift the latch end of the door slightly to align the latch with the mating part on the stove bottom.
- Properly dispose of the ash in a metal container with a tight-fitting lid. Store the container outdoors away from all combustible material.
- Return the ash pan to its original position in the stove, and close and latch the ash door.



WARNING

Do not operate the stove with the ash door open. This will result in over-firing, and could cause damage to the stove, void the warranty, or even lead to a house fire.

Empty the ash pan regularly, typically every one to three days. The frequency will vary depending on how you operate your Intrepid FlexBurn®: ash will accumulate faster at higher heat outputs.

Removed ash should be placed outdoors in a metal container with a tight-fitting lid. Keep the closed container of ash on a noncombustible floor or on the ground, well away from all combustible materials, pending final disposal. If the ash is disposed of by burial in soil or otherwise locally dispersed, it should be kept in the closed container until all cinders have thoroughly cooled.



CAUTION

Never use your household or shop vacuum cleaner to remove ash from the stove; always remove and dispose of the ash properly.

F. Opacity (Visible Smoke)

This is the measure of how cleanly your appliance is burning. Opacity is measured in percent; 100% opacity is when an object is totally obscured by the smoke column from a chimney, and 0% opacity means that no smoke column can be seen. As you become familiar with your appliance, you should periodically check the opacity. This will allow you to know how to burn as nearly smoke-free as possible (goal of 0% opacity).



WARNING



Fire Risk

- DO NOT BURN GARBAGE OR FLAMMABLE FLUIDS SUCH AS GASOLINE, NAPHTHA OR ENGINE OIL.

- Do NOT burn treated wood or wood with salt (driftwood).
- May generate carbon monoxide if burn material other than wood.

May result in illness or possible death.



WARNING



Fire Risk

Keep combustible materials, gasoline and other flammable vapors and liquids clear of appliance.

- Combustible materials may ignite.
- Do NOT store flammable materials in the appliance's vicinity.
- DO NOT USE GASOLINE, LANTERN FUEL, KEROSENE, CHARCOAL LIGHTER FLUID OR SIMILAR LIQUIDS TO START OR "FRESHEN UP" A FIRE IN THIS Appliance.
- Keep all such liquids well away from the appliance while it is in use.



CAUTION

When burning your first fire, you will experience smoke and odor from the appliance resulting from the curing of paint and burning off of any oils remaining from manufacturing.

OPEN WINDOWS DURING INITIAL BURN TO DISSIPATE SMOKE AND ODORS!

- Odors may be irritating to sensitive individuals.
- Smoke detectors may activate.

G. Negative Pressure



WARNING



Asphyxiation Risk

- Negative pressure can cause spillage of combustion fumes, soot and carbon monoxide.
- Appliance needs to draft properly for safety.

Negative pressure results from the imbalance of air available for the appliance to operate properly. It can be strongest in lower levels of the house.

Causes include:

- Exhaust fans (kitchen, bath, etc.)
- Range hoods
- Combustion air requirements for furnaces, water appliances and other combustion appliances
- Clothes dryers
- Location of return-air vents to furnace or air conditioning
- Imbalances of the HVAC air handling system
- Upper level air leaks such as:
 - Recessed lighting
 - Attic hatch
 - Duct leaks

To minimize the effects of negative air pressure:

- Install the outside air kit with the intake facing prevailing winds during the heating season
- Ensure adequate outdoor air for all combustion appliances and exhaust equipment
- Ensure furnace and air conditioning return vents are not located in the immediate vicinity of the appliance
- Avoid installing the appliance near doors, walkways or small isolated spaces
- Recessed lighting should be a "sealed can" design
- Attic hatches weather stripped or sealed
- Attic mounted duct work and air handler joints and seams taped or sealed

- Creosote

Creosote is a by-product of slow wood-burning. It's an organic tar that can condense in the flue if it is present in the exhaust, slow-moving, and cools to less than 290°F (130°C). Condensed creosote is volatile, and can generate chimney fires if it gets hot enough. All the features that affect chimney draft also affect creosote condensation - so use whatever combination of installation features and operational steps that will encourage good draft and minimize creosote production.

Because letting the exhaust cool off and slow down is one of the keys to creosote accumulation, it makes sense to line a chimney to match the stove's outlet size, for safety reasons as well as performance. Canadian law requires a matching liner to serve any stove or insert vented through a fireplace chimney; in the US, the National Fire Protection Association (NFPA) recommends a chimney liner if the flue is more than three times bigger (in square area) than the outlet on the stove or insert. Some localities enforce the NFPA guidelines as part of their building codes.

Fuel

Even the best stove installation will not perform well with poor fuel. The best fuel is hardwood that has air-dried 12-18 months. Softwood burns, but not as long as hardwood. 'Green' wood contains a lot of moisture; it will burn, but some of the heat potential is used to boil the extra moisture from the wood. This reduces the amount of heat that reaches your home and can contribute to a creosote problem. There are moisture meters available for firewood; you can also judge your wood by its appearance and weight. If you get it green, lift a piece and get a sense of its weight; it can lose a third or more of its weight as it dries. Also look at the ends of a log; as it dries it shrinks and often cracks. The more weathered and cracked a piece is, the drier it is.

Dry wood burns readily with a good chimney draft. But with modern stoves, wood can be too dry and too volatile. Smoke and combustible gases can 'gas out' from the wood quickly and densely enough to overload the combustion system. If you hear a rumbling or roaring noise (like a propane torch) from the stove, that is a sign that the stove is over-firing.

Back-puffing

Back-puffing results when the fire produces volatile gases faster than the chimney draft pulls them out of the firebox. The gases back up in the firebox until they are concentrated enough and hot enough to ignite. If your stove back-puffs, the stove needs to cool down. You should open the damper to let the smoke rise to the flue more quickly, allow more air into the firebox, avoid big loads of firewood and check that the wood moisture is not too low.

Draft Testing

An easy way to test your chimney draft is to close the stove's damper, wait a few minutes to let the airflow stabilize, then see whether you can vary the strength of the fire by swinging the air control open and closed. Results are not always instant; you may need to wait a few minutes for a change in the air control setting to have an effect on the fire. If there's no change, then the draft isn't strong enough yet to let you close the damper, and you'll need to open it for awhile longer and manage the fire with the air inlet until the draft strengthens. If you keep track of your burning habits and relate them to their effects on the stove's operation, you'll be rewarded with good performance and a safe system.

Conclusion

Wood-burning is an art rather than a science. Once the stove and chimney system are in place, you can only vary your technique, mostly your timing, to achieve good results. If you keep track of your burning habits and relate them to their effects on the stove's operation, you'll be rewarded with good performance and years of reliable heating.

3 Maintenance

Keep Your Stove Looking New and Working Its Best

Let the fire in the stove go out and allow the stove to cool completely before beginning any maintenance procedure.

Care of the Cast Iron Surface

An occasional dusting with a dry rag will keep the painted cast iron of your Intrepid FlexBurn® looking new.

The stove's paint can be touched up as needed. First, mask the areas, such as enameled parts, glass, or handles, around the spot to be painted. Clean the spot with a wire brush. Remove the griddle and set it aside. It is normal for the griddle to darken after use. You can clean it with a fine-bristle wire brush, or steel wool.

Then, touch up the stove with high temperature stove paint. Apply the paint sparingly; two light coats of paint are better than a single heavy one.

Care of the Porcelain Enamel Surface

Use a dry or slightly damp rag or soft brush to remove spills or stains. For difficult jobs that require a cleaning agent, use only a kitchen appliance cleaner or polish recommended for use on enamel surfaces.

If porcelain enamel becomes chipped or scratched during use, apply "enamel epoxy" to the damaged area and allow to dry. Once the epoxy has dried, sand the area to blend with surrounding area and apply appropriate color touch-up paint. Allow to dry completely before operating stove.

A. Cleaning the Glass & Replacement

Most of the carbon deposits on the glass will burn off during hot fires.

However, the ash residue that accumulates on the glass surface should be removed regularly to prevent etching. To clean the glass, follow this procedure:

- Be sure the glass is completely cool.
- Clean the glass with water or a cleaner made especially for this purpose. Do not use abrasive cleaners. Use cleaning agents sparingly and be sure to keep them off the outer surfaces of the stove.
- Rinse the glass thoroughly.
- Dry the glass completely.

Replace Broken Glass Immediately

Do not operate your stove if the glass in the doors is damaged.

If you need to replace the glass, use only the high temperature 5 mm ceramic glass supplied by Vermont Castings. Do not use substitutes.

Removing the Glass

1. Remove the right and left door assemblies by raising the door until the lower and upper hinge pin clears its holes. Place the doors face down on a padded work surface. Be especially careful with enameled doors.
2. Remove the screws that hold the glass retainer clips in place, and remove the clips.
3. Carefully lift the broken glass panel from the door.

Installing the Glass

Check the gasket around the window; it should be soft and resilient so that the glass will seal properly against the door. Replace the gasket if it has hardened or if it is compressed.

1. Center the glass on the gasket.
2. Secure the glass on both doors with the retainer clips. Tighten all screws. (Figure 2.11)
3. Replace the doors on the stove.
4. Open and close the doors to check that they fit and work properly. Adjust as necessary.

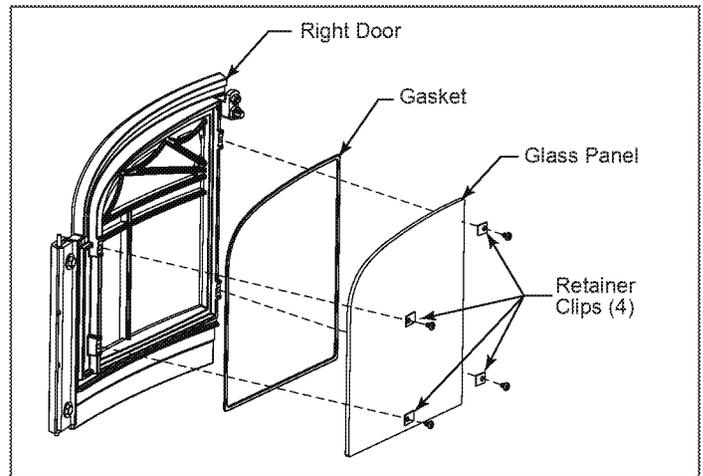


Figure 2.11 - Exploded view of the glass assembly for the right door.

B. Damper Adjustment (as Needed)

The tension on the Intrepid FlexBurn's damper is adjustable to compensate for compression of the gasket that seals the damper to the upper fireback. To adjust the damper:

1. Remove the griddle. Loosen the lock nut at the center of the damper. (Figure 2.12)
2. Turn the pressure screw approximately one half turn clockwise with an Allen wrench provided with your stove.
3. Tighten the lock nut. Prevent the pressure screw from turning as you tighten the nut. Re-test the damper.

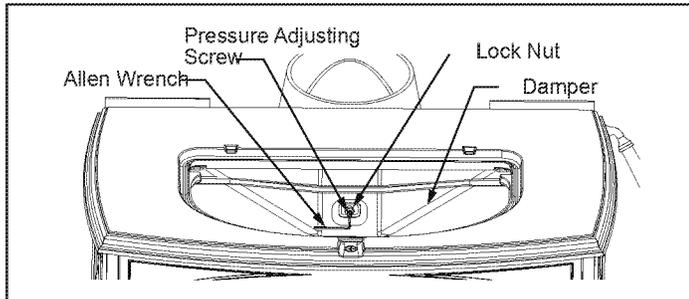


Figure 2.12 - Adjust the damper with the Allen wrench.

Tighten the Damper Handle as Needed

A handle on the left side of the stove controls the damper. The handle attaches to the damper rod with a set screw. Periodically check the set screw and tighten as necessary.

C. Door Latch Adjustment

The front door of the stove should close securely to prevent accidental opening and should close tightly to prevent air from leaking into the fire chamber. The door handle will be positioned vertically when the door is closed.

Over a period of time, the gasket around the door will compress and the latch may need adjustment. To adjust the handle, follow this procedure:

1. Remove and retain the lock nut with a 9/16" wrench. (Figure 2.13)
2. Loosen the set screw with a 1/8" Allen wrench.
3. Rotate the pawl 180°. Replace the lock nut. Tighten the set screw. Figure 2.13.
4. Additional adjustment can be made by removing the flat washer. Or any combination of washer removal and/or pawl rotation.

Test the door seal. Close the door on a dollar bill and attempt to pull it free. If the bill is freed with little resistance, the gasket isn't snug enough at that spot. Continue to make small adjustments until the setting is right.

If additional adjusting of the latch does not enable the door to seal sufficiently in one area, try adjusting the gasket in that area. Pack more cement or a smaller diameter gasket into the channel beneath the gasket so the main gasket is raised and makes contact with the door frame. If this procedure doesn't solve the problem, replace the gasket. Instructions for gasket replacement are given later in this section.

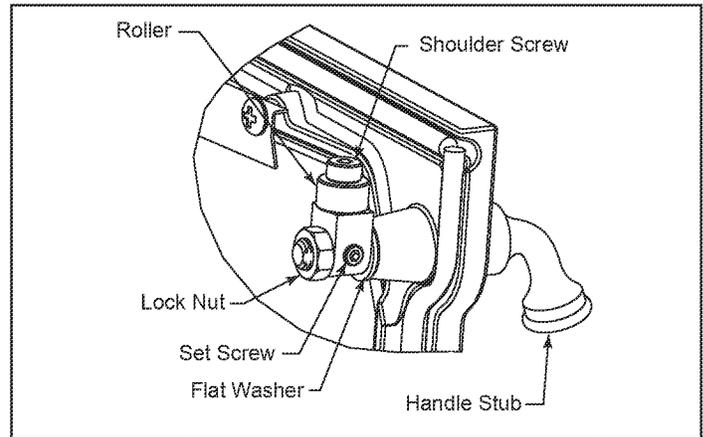


Figure 2.13 - Rotate pawl and/or remove flat washer to adjust latch.

D. Gasket Replacement (as Needed)

Your Intrepid FlexBurn® uses fiberglass rope gaskets to make a tight seal between some parts. With use, particularly on moving parts, gaskets can become brittle and compressed and can begin to lose their effectiveness. These will need periodic replacement.

The sizes of replaceable gasket are listed below, along with their applications.

Gasket Diameter.....And the Parts it Seals

- 5/16" The griddle to the stove top (wire reinforced gasket)
- 3/8" The damper to the upper fireback
- 5/16" The front doors to the stove front; and the doors to each other.
- 5/16" The ash door to the front of the bottom panel
- 3/16" The outer glass panes to the door

If you need to change a gasket, first obtain an appropriate replacement from your Vermont Castings' Authorized Dealer.

Wait until the fire is out and the stove has cooled. Be sure to follow the standard safety procedure for working with dusty materials: wear safety goggles and a dust mask.

The procedure for replacing gaskets is the same, regardless of the gasket location. Follow these steps:

1. Remove the existing gasket by grasping an end and pulling firmly. (Figure 2.14)

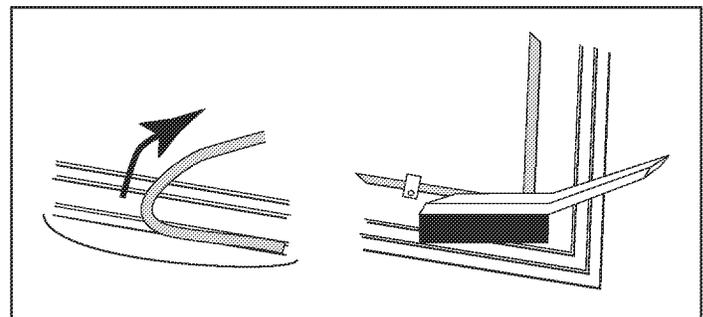


Figure 2.14 - Remove gasket then clean channel with wire brush.

2. Use a wire brush or the tip of a screwdriver to clean the channel of any remaining cement or bits of gasket. Remove stubborn deposits of cement with a cold chisel if necessary. (Figure 2.14)
 3. Determine the correct length of the appropriate-sized gasket by laying it out in the channel. Allow an extra 1-2" (25-50 mm), and mark the spot to be cut.
 4. Remove the gasket from the channel, place it on a wood cutting surface, and cut it at the marked spot with a utility knife.
- Twist the ends slightly to keep the gasket from unraveling.
5. Lay an unbroken 1/8" (3 mm) bead of silicone or cement in the newly-cleaned channel. (Figure 2.15)

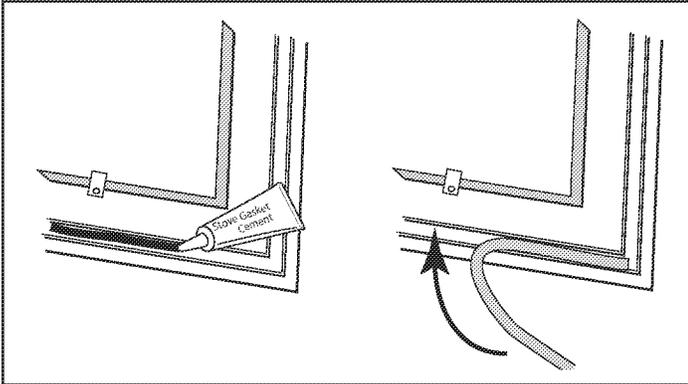


Figure 2.15 - Lay a bead of gasket silicone or cement then press gasket in place.

6. Starting at one end, press the gasket into the channel. (Figure 2.15) Ensure a good joint where the gasket meets before trimming any excess. Do not overlap the gasket ends or leave ends with ragged edges.
7. Press the gasketed part firmly against its normal mating surface to seat the gasket evenly in its channel. Close and latch the door to do this, or tap other parts with the rubber mallet (or hammer/block of wood).
8. Clean any excess cement from around the channel, then let the cement that holds the new gasket dry thoroughly.
9. The stove's doors may need adjustment after you have regasketed them. Initially, it may require loosening the latch to accommodate the new gasket; after a few weeks, it may need tightening to compensate for compression of the new gasket.

All Gasketed Construction Gaskets

Other gaskets form seals between all other non-moving parts, but these are not subject to the same wear and deterioration as gaskets on moving parts. It is unlikely that you will ever need to replace these gaskets unless the involved parts are disassembled and then put back together. If this is the case, the job should be done only by a qualified service technician.

5/16" diameter gasket seals the following parts:

- The lower fireback to the back panel
- The left and right air plates (inner sides)
- All connections between the stove plates.

E. The Chimney System

Creosote

Your Intrepid FlexBurn® is designed to reduce creosote build-up significantly. However, regular chimney inspection and maintenance must still be performed. For safety, good stove performance, and to protect your chimney and chimney connector, inspect your chimney and chimney connector on a regular schedule. Clean the system if necessary. Failure to keep the chimney and connector system clean can result in a serious chimney fire.

When wood is burned slowly, it produces tar, organic vapors and moisture that combine to form creosote. The creosote vapors condense in the relatively cool chimney flue of a slow-burning fire. As a result, creosote residue accumulates on the flue lining. When ignited, this creosote makes an extremely hot fire within the flue system that can damage the chimney and overheat adjacent combustible material. If a significant layer of creosote has accumulated —1/8" (3 mm) or more — it should be removed to reduce the risk of a chimney fire.

You can never be too safe. Contact your local fire authority for information on what to do in the event of a chimney fire, and have a clearly understood plan on how to handle one.

If you do experience a chimney fire, act promptly to:

- Close the damper and air control lever.
- Get everyone out of the house.
- Call the Fire Department.

Inspect the system every two weeks during the heating season as part of a regular maintenance schedule. To inspect the chimney, let the stove cool completely. Then, using a mirror and a strong light, sight up through the flue collar into the chimney flue. If you cannot inspect the flue system in this fashion, the stove must be disconnected to provide better viewing access.

Clean the chimney using a brush the same size and shape as the flue liner. Flexible fiberglass rods are used to run the brush up and down the liner, causing any deposits to fall to the bottom of the chimney where they can be removed through the clean-out door.

Clean the chimney connector by disconnecting the sections, taking them outside, and removing any deposits with a stiff wire brush. Reinstall the connector sections after cleaning, being sure to secure the joints between individual sections with sheet metal screws.

If you cannot inspect or clean the chimney yourself, contact your local Vermont Castings dealer or a professional chimney sweep.

Maintenance Schedule - The Stove

Daily:

- Clear any ash build-up from around the air holes and combustion flow path in the lower fireback.
- Ashes should be removed before they reach the top of the ash pan. Check accumulation at least once a day.
- Keep the area around the stove clear of any combustible materials such as wood, furniture or clothing.

Two Months:

- Check door handle to be sure it is working properly. Gasketing becomes compressed after a period of time. Adjust handle tightness if necessary.
- Check leg bolts and heat shield screws; tighten if necessary.

Annual Spring Cleaning:

- Check gasketing for wear, and replace if necessary.
- Remove ashes from the ash pan and replace with a moisture absorbing material (such as kitty litter) to keep the interior of the stove dry.
- Clean the dust from the inner sides of bottom, rear or pipe heat shields if your stove is equipped with them. Clean surfaces are better heat reflectors than dirty surfaces.
- Touch up the black paint.
- Inspect for and remove ash build-up behind the combustion package. This should be done in conjunction with annual cleaning of the chimney connector. Inspect the passage behind the combustion package (a mirror will be helpful) and vacuum away ash using a flexible vacuum hose inserted in the passage. (Figure 2.16)

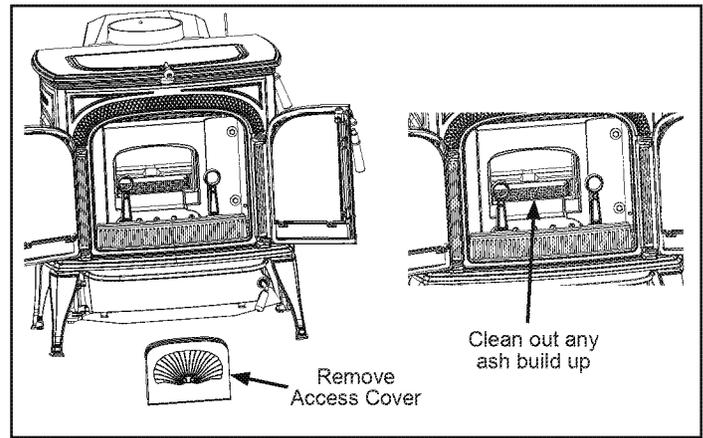


Figure 2.16 - Inspect and clean out ash accumulation behind the combustion system.

The Chimney Connector

Two Weeks

- Inspect the chimney connector and chimney. Clean if necessary.

Two Months:

- Inspect the chimney and chimney connector. Pay particular attention to the horizontal runs of chimney connector, and the elbows. Clean the system if necessary.

Annual Spring Cleaning:

- Disassemble the chimney connector and take it outdoors for inspection and cleaning. Replace weak sections of connector.
- Inspect the chimney for signs of deterioration. Repairs to a masonry chimney should be made by a professional mason. Replace damaged sections of prefabricated chimney. Your local Vermont Castings dealer or a chimney sweep can help determine when replacement is necessary.
- Thoroughly clean the chimney.

F. The Catalytic Element

This wood heater has an optional catalytic combustor, which needs periodic inspection and replacement for proper operation. In the United States it is against the law to operate this wood heater in a manner inconsistent with the operating instructions in this manual.

Under normal operating conditions, the catalytic combustor should remain active for five to seven years (depending on the amount of wood burned). However, it is important to monitor the combustor periodically to ensure that it is functioning properly, as well as to determine when it needs to be replaced. A non-functioning combustor will result in a loss of heating efficiency, and an increase in creosote and emissions.

Inspection and Cleaning

Inspect the combustor for fly ash accumulation and physical damage two to three times per year. Clean the combustor as needed.

The refractory package that houses the catalytic combustor should be inspected for a buildup of fly ash and cleaned if necessary. This may be done when you examine the combustor.

When to Suspect a Combustor Problem

The best way to evaluate the performance of your Intrepid FlexBurn's combustor is to observe the amount of smoke leaving the chimney—both when the combustor has “lighted-off” and when it has not. Follow these steps:

- With a fire going and the combustor properly activated, with the damper closed to route smoke through it as described in the Operation Section, go outside and observe the smoke leaving the chimney.
- Then, open the stove damper and once again check the smoke leaving the chimney.

You should see significantly more smoke when the stove damper is open and exhaust does not pass through the combustor. However, be careful not to confuse smoke with steam from wet wood. Steam dissipates in the air quickly; smoke does not.

If this test indicates a problem, consider other possible factors as well, such as the weather or a change in the quality of your fuel. In warm weather, draft is weaker than it is in colder winter weather, and fires can burn sluggishly. Small, hot fires are a good solution under these conditions.

Burning “green” (insufficiently seasoned) wood will result in poorer performance than burning properly seasoned fuel. Reloading with green wood can also thermal shock the catalyst, resulting in cracking, or the eventual fallout, of the ceramic honeycomb substrate. You may have to run your stove hotter (more air) to achieve acceptable performance using green or wet wood.

Also, consider any changes in your operating routine.

Once you have ruled out any other possible causes for a decline in performance, inspect and clean the combustor if necessary. Be sure to protect any surface you use for setting the stove parts aside.

Inspecting the Combustor

Remove access door and inner fireback. Remove the catalytic combustor by lifting up and pulling towards you. (Figure 2.17)

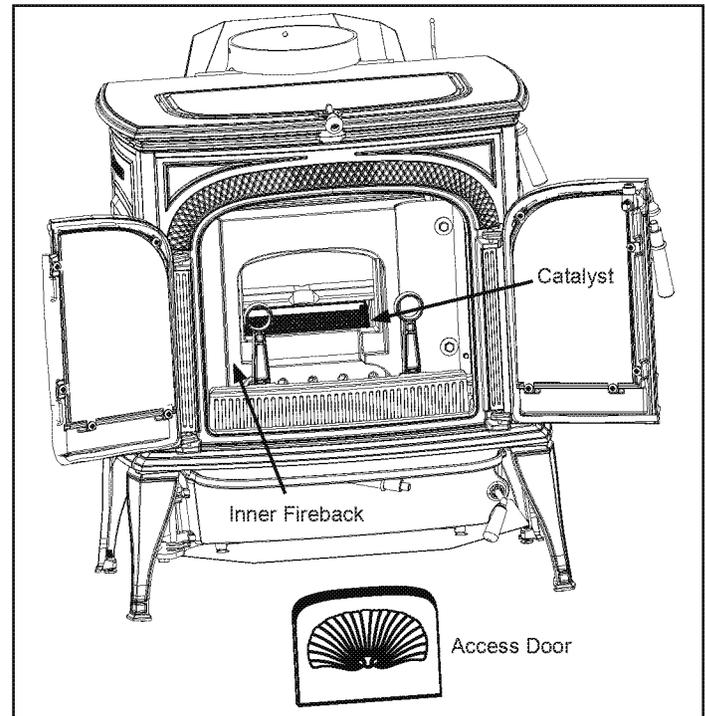


Figure 2.17 - Inspect the catalytic combustor.

To assure a long life for the combustor, it is recommended to service the combustor on a regular basis based on the amount of use. This procedure takes about five (5) minutes and requires no tools except for a vacuum if cleaning is necessary.

Cleaning the Combustor

1. Check the combustor's honeycomb-like element for a buildup of fly ash. If any is evident, take the combustor outside and clean it by blowing air gently through it. Do not push anything through the honeycomb; do not use compressed air to clear the passages. Such abrasion can scrape the thin coating of platinum (the catalyst) off the ceramic base, shortening the catalyst's life and reducing its effectiveness.
2. Inspect the element for damage or degradation. Although small hairline cracks will not affect performance, the element should be essentially intact. If the element is broken in pieces or has sections missing, it should be replaced. Call your local Vermont Castings Authorized Dealer for a replacement element.
3. If the element is in good condition and clean, re-install it in the stove and replace the refractory inner fireback and access door.

Operate the stove in your usual manner for two weeks, inspecting the chimney and the chimney connector frequently during this period.

If creosote does not build up as fast, it is likely that the performance change was caused by fly ash deposits on the catalytic element. However, continue the inspections of the chimney system for a few weeks to ensure that proper performance continues.

If you continue to find a significant creosote buildup or if you continue to see excessive smoke from the chimney, the catalytic element will need to be replaced. Contact your nearest Vermont Castings' Authorized Dealer for information about a replacement element.

NOTE: Use only the replacement catalyst supplied by a Vermont Castings dealer.

4 Troubleshooting Guide

With proper installation, operation, and maintenance your wood appliance will provide years of trouble-free service. If you do experience a problem, this troubleshooting guide will assist you or a qualified service person in the diagnosis of a problem and the corrective action to be taken.

Start Fire Problems	Possible Cause	Solution	
<ul style="list-style-type: none"> • Can not get fire started • Excessive smoke spillage • Burns too slowly • Not enough heat output 	Not enough kindling/paper or no kindling/paper	Use dry kindling, more paper. Arrange kindling & wood for air movement.	
	Not enough air for fire to ignite	Check for restricted termination cap	
		Check for blockage of outside air kit (if installed).	
		Check for flue blockage.	
		Pre-warm flue before starting fire (refer to Building a Fire Section).	
		Check for adequate vent height (refer to Chimney Height Section).	
	Refer to Negative Pressure section		
	Wood condition is too wet, too large	Use dry, seasoned wood (refer to Seasoned Wood Section).	
Bed of coals not established before adding wood	Start with paper & kindling to establish bed of coals (refer to Building a Fire Section).		
Flue blockage such as birds' nests or leaves in termination cap	Have chimney inspected for creosote and cleaned by a certified chimney sweep.		
Down draft or negative pressure Competition with exhaust devices	Do not use exhaust fans during start-up (refer to Negative Pressure Section).		
Fire burns too fast	Extremely dry or soft wood	Mix in hardwood.	
		Mix in larger pieces of wood after fire is established.	
	Overdrafting	Check for correct vent height; too much vertical height creates overdrafting.	
Check location of vent termination (refer to Chimney Termination Requirement Section).			
Low Heat Output	Coal Bed too small	Open damper. Establish deeper coal bed and move coals to the rear of the firebox.	
Excessive Coal Bed	Operating on high for extended periods	Reduce burn rate and allow coals to burn down before reloading.	

Contact your dealer for additional information regarding operation and troubleshooting.
Visit www.vermontcastings.com to locate a dealer.

B. Service Parts & Accessories

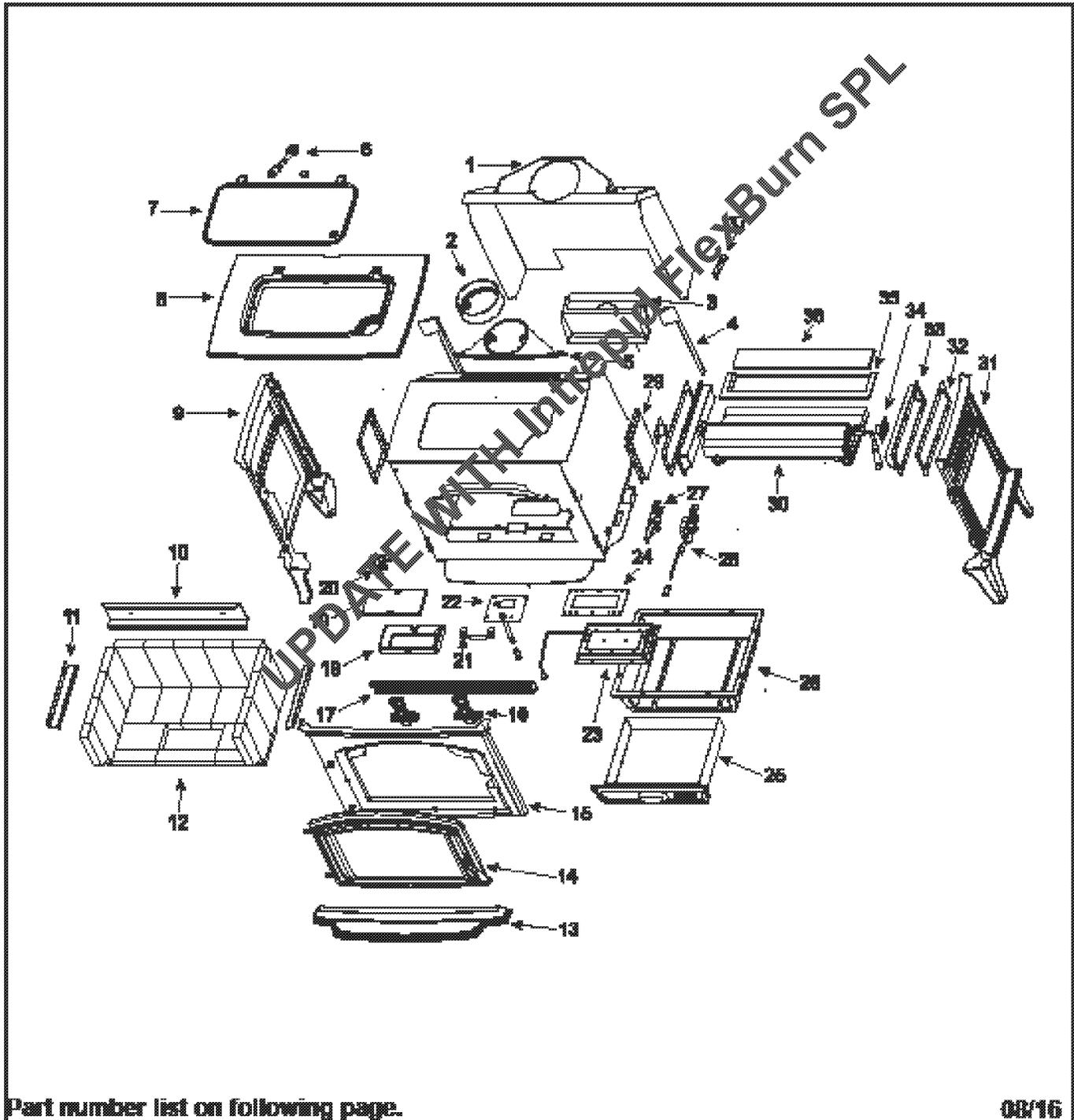
QUADRA-FIRE Service Parts

Explorer III

Wood Stove

Beginning Manufacturing Date: Feb 2015
Ending Manufacturing Date: Active

Color	SKU	Qty. (Each)
Matte Black	EXPLR-III-BBK	8215-
Porcelain Black	EXPLR-III-PBK	8215-
Porcelain Dark Blue	EXPLR-III-PDB	8215-
Porcelain Frost	EXPLR-III-PFT	8215-
Porcelain Mahogany	EXPLR-III-PMH	8215-



Part number list on following page.

08/16

IMPORTANT: THIS IS DATED INFORMATION. Parts must be ordered from a dealer or distributor. Hearth and Home Technologies does not sell directly to consumers. Provide model number and serial number when requesting service parts from your dealer or distributor.



Stocked
at Depot

ITEM	DESCRIPTION	COMMENTS	PART NUMBER	
1	Shroud Assembly		SRV7000-009	
2	Flue Collar		SRV7001-201	
3	Outside Air Chamber		SRV7001-014	
4	Convection Mount Plates	Qty 2 req	SRV7000-107	
5	Flue Transition		SRV700138	
6	Top Load Handle Assembly		SRV7060-055	
	Top Load Handle Receiver		SRV7060-257	
7	Lid Assembly		SRV7000-006	
	Gasket, Rope 1/4"		834-1400	Y
8	Top	Marble Black	7000-101MEK	
		Porcelain Mahogany	7000-101PMH	
		Porcelain Dark Blue	7000-101PDB	
		Porcelain Black	7000-101PBK	
		Porcelain Frost	7000-101PFT	
	Gasket, 7/16"		844-3000	Y
9	Side Left	Marble Black	7000-034MEK	
		Porcelain Mahogany	7000-034PMH	
		Porcelain Dark Blue	7000-034PDB	
		Porcelain Black	7000-034PBK	
		Porcelain Frost	7000-034PFT	
10	Rear Brick Retainer		SRV7000-133	
11	Side Brick Retainer	Qty 2 req	SRV7000-103	
12	Brick Assembly		SRV7000-017	
13	Ashlip	Marble Black	7000-113MEK	
		Porcelain Mahogany	7000-113PMH	
		Porcelain Dark Blue	7000-113PDB	
		Porcelain Black	7000-113PBK	
		Porcelain Frost	7000-113PFT	

Additional service part numbers appear on following page.

IMPORTANT: THIS IS DATED INFORMATION. Parts must be ordered from a dealer or distributor. Hearth and Home Technologies does not sell directly to consumers. Provide model number and serial number when requesting service parts from your dealer or distributor.



Stocked at Depot

ITEM	DESCRIPTION	COMMENTS	PART NUMBER	
#14 Door Assembly				
14	Door Assembly	Matte Black	7080-028MEK	
		Porcelain Mahogany	7080-028PMH	
		Porcelain Dark Blue	7080-028PDB	
		Porcelain Black	7080-028PBK	
		Porcelain Frost	7080-028PFT	
	Gasket, Rope 1/4"		834-1400	Y
14.1	Glass Retainers		SRV7083-106	Y
14.2	Glass Assembly		SRV7080-029	
14.3	Door	Matte Black	7080-204MEK	
		Porcelain Mahogany	7080-204PMH	
		Porcelain Dark Blue	7080-204PDB	
		Porcelain Black	7080-204PBK	
		Porcelain Frost	7080-204PFT	
14.4	Door Handle Assembly		SRV7080-031	Y
14.5	Fiber Handle		SRV7080-212	Y
14.6	Door Handle		SRV7083-137	
14.7	Washer, See, 3/16 (3 Ea)	Plg of 3	832-0800	Y
14.8	Cam Latch		430-1141	
14.9	Nut, 2W/4 Side Lock Jam 3	Plg of 24	226-D100/24	Y
14.10	Key, Cam Latch		430-1151	

Additional service part numbers appear on following page.

Beginning Manufacturing Date: Feb 2015
Ending Manufacturing Date: Active

IMPORTANT: THIS IS DATED INFORMATION. Parts must be ordered from a dealer or distributor. Hearth and Home Technologies does not sell directly to consumers. Provide model number and serial number when requesting service parts from your dealer or distributor.



Stocked at Depot

ITEM	DESCRIPTION	COMMENTS	PART NUMBER	
15	Front	Marble Black	7000-103MBK	
		Porcelain Mahogany	7000-103PMH	
		Porcelain Dark Blue	7000-103PDB	
		Porcelain Black	7000-103PBK	
		Porcelain Frost	7000-103PFT	
	Gasket, 7/16"		8413000	Y
16	Andirons	2 pcs	SRV7001-020	
17	Front Air Channel		SRV7000-132	
18	ARS Channel		SRV7001-184	
19	ARS Access Cover		SRV7008-106	
20	ARS Latch Assembly	Pre 007000300534	SRV7001-023	
		Post 007000300535	SRV7000-050	
21	Burn Rate Indicator		SRV7001-181	
22	Burn Rate Control		SRV7000-027	
	Handle, Fiber		SRV7000-202	
23	ARS Door Assembly	Pre 007000300534	SRV7001-021	
		Post 007000300535	SRV7000-048	
24	Gasket, ARS		SRV7003-206	Y
25	Ashpan		SRV7000-023	
26	ARS Box		SRV7000-005	
27	Timer Door		SRV7000-040	
28	Timer Assembly		SRV7000-036	
	Timer (Only) Replacement Assembly		SRV480-1940	
29	Secondary Channels	Qty 2 req	SRV7000-208	
28	Timer Assembly		SRV7000-036	
	Handle, Fiber		SRV7000-202	
	Timer (Only) Replacement Assembly		SRV480-1940	
29	Secondary Channels	Qty 2 req	SRV7000-208	
27	Timer Door		SRV7000-040	
28	Timer Assembly		SRV7000-036	
	Timer (Only) Replacement Assembly		SRV480-1940	Y
29	Secondary Channels	Qty 2 req	SRV7000-208	

Additional service part numbers appear on following page.

IMPORTANT: THIS IS DATED INFORMATION. Parts must be ordered from a dealer or distributor. Hearth and Home Technologies does not sell directly to consumers. Provide model number and serial number when requesting service parts from your dealer or distributor.



Stocked
at Depot

ITEM	DESCRIPTION	COMMENTS	PART NUMBER	
#30 Baffle Assembly				
30	Baffle Assembly		SRV7000-025	
30.1	Baffle Cover Top (Includes Insulation Blanket)		SRV7000-238	
30.2	Baffle Blanker		SRV7000-233	Y
30.3	Baffle Plate		SRV7000-250	
30.4	Baffle Board		SRV7000-148	Y
30.5	Secondary Tubes	Qty 3 req	SRV7000-228	Y
30.6	Baffle Cover Plates		SRV7000-208	
30.7	Baffle Linkage		SRV7000-044	
31	Side Sight	Marble Black	7000-033MEK	
		Porcelain Mahogany	7000-033PMH	
		Porcelain Dark Blue	7000-033PDB	
		Porcelain Black	7000-033PBK	
		Porcelain Frost	7000-033PFT	
32	Manifold Gaskets	Qty 2 req	SRV7000-221	
33	Air Supply Chambers	Right and Left	SRV7000-189	
34	Fluot Tube Assemblies	Qty 2 req	SRV7000-018	
35	Rear Baffle Plate		SRV7000-201	
36	Baffle Board Rear		SRV7000-213	
37	Top Load Handle Hanger		SRV7000-262	

Additional service part numbers appear on following page.

IMPORTANT: THIS IS DATED INFORMATION. Parts must be ordered from a dealer or distributor. Hearth and Home Technologies does not sell directly to consumers. Provide model number and serial number when requesting service parts from your dealer or distributor.



Stocked at Depot

ITEM	DESCRIPTION	COMMENTS	PART NUMBER	
	Component Pack	Marble Black	SFRV7000-038	
		Porcelain Mahogany	SFRV7000-039	
		Porcelain Dark Blue	SFRV7000-041	
		Porcelain Black	SFRV7000-042	
		Porcelain Frost	SFRV7000-043	
	Leveling Assembly		7000-000	
	Paint Touch-Up	Marble Black	812-0010	
		Porcelain Mahogany	805-1450	
		Porcelain Dark Blue	1-00-0020	
		Porcelain Black	1-00-0022	
		Porcelain Frost	1-00-0021	
ACCESSORIES				
	Blower Assembly		BK-ACC	
	Blower Control Box W/Switch		SFRV7000-104	Y
	Component Pack		7033-051	
	Magnet Round		SFRV7000-140	Y
	Snap Disc Bracket Assembly		7033-038	
	Snap Disc, # 1, Connection Blower		SFRV230-0470	Y
	Speed Control Only (Rheostat)		812-0370	Y
	Wire Harness (Blower)		7033-202	
	Blower, Connection	Blower Only	812-4800	Y
	Outside Air Kit, Floor & Rear		OAK-ACC	
	Outside Air Collar Assembly		7033-039	
	Outside Air Shield		33271	Y
	Firescreen		SCR-7000	
FASTENERS				
	Ank Rivnut Repair Kit - 1/4-20 & 3/8-10 Rivnut Tools		RIVNUT-REPAIR	Y
	Nut, Ser Flange Small 1/4-20	Pkg of 24	228-0130/24	Y
	Screw, Pan Head Philips 8-32 X 3/8	Pkg of 40	225-0500/40	Y
	Screw, Sheet Metal #8 X 1/2 S-Grip	Pkg of 40	12480/40	Y
	Washer, 1/4 See	Pkg of 24	20758/24	Y

C. Contact Information

VERMONT CASTINGS

CONTACT INFORMATION

Hearth & Home Technologies
352 Mountain House Road
Halifax, PA 17032

Please contact your Vermont Castings dealer with any questions or concerns.

For the number of your nearest Vermont Castings dealer

log onto www.vermontcastings.com

CAUTION



DO NOT DISCARD THIS MANUAL

- Important operating and maintenance instructions included.
- Read, understand and follow these instructions for safe installation and operation.
- Leave this manual with party responsible for use and operation.



We recommend that you record the following pertinent information for your heating appliance.

Date purchased/installed: _____

Serial Number: _____ Location on appliance: _____

Dealership purchased from: _____ Dealer phone: _____

Notes: _____

This product may be covered by one or more of the following patents: (United States) 5341794, 5263471, 6688302, 7216645, 7047962 or other U.S. and foreign patents pending.



Installation Manual

Installation & Appliance Set-Up

INSTALLER: Leave this manual with party responsible for use and operation.

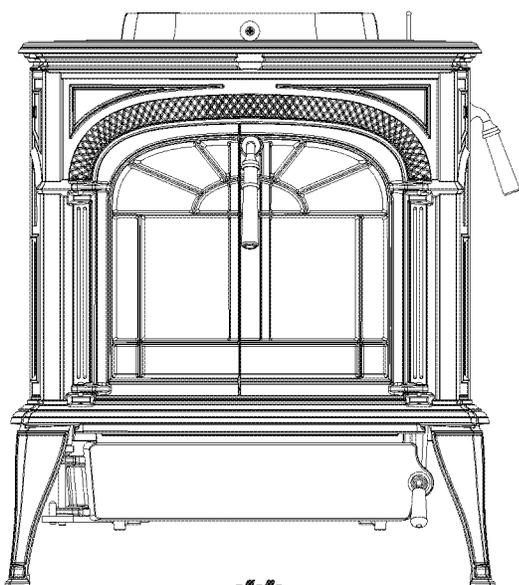
OWNER: Retain this manual for future reference.

NOTICE: DO NOT DISCARD THIS MANUAL

VERMONT CASTINGS

Intrepid FlexBurn® Wood Burning Stove

Model 2115 / 2115-CAT



Tested & Listed By  Portland Oregon USA
OMRI - Test Laboratories, Inc.

WARNING



Fire Risk

For use with solid wood fuel only.

Other fuels may over fire and generate poisonous gases (i.e. carbon monoxide).

WARNING



If the information in these instructions is not followed exactly, a fire may result causing property damage, personal injury, or death.

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- Do not over fire - If appliance or chimney connector glows, you are over firing. Over firing will void your warranty.
- Comply with all minimum clearances to combustibles as specified. Failure to comply may cause house fire.

WARNING



HOT SURFACES!

Glass and other surfaces are hot during operation AND cool down.

Hot glass will cause burns.

- Do not touch glass until it is cooled
- NEVER allow children to touch glass
- Keep children away
- CAREFULLY SUPERVISE children in same room as fireplace.
- Alert children and adults to hazards of high temperatures
- **High temperatures may ignite clothing or other flammable materials.**
- Keep clothing, furniture, draperies and other flammable materials away.

NOTE

To obtain a French translation of this manual, please contact your dealer or visit www.vermontcastings.com

Pour obtenir une traduction française de ce manuel, s'il vous plaît contacter votre revendeur ou visitez www.vermontcastings.com

Installation and service of this appliance should be performed by qualified personnel. Hearth & Home Technologies recommends HHT Factory Trained or NFI certified professionals.


hearthED
FACTORY TRAINING
Fuel Your Fire

 NATIONAL
FIREPLACE
INSTITUTE
A CERTIFICATION AGENCY

! Safety Alert Key:

- **DANGER!** Indicates a hazardous situation which, if not avoided will result in death or serious injury.
 - **WARNING!** Indicates a hazardous situation which, if not avoided could result in death or serious injury.
 - **CAUTION!** Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
 - **NOTICE:** Indicates practices which may cause damage to the appliance or to property.
-

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➔ = Contains updated information

1 Important Safety Information

A. Appliance Certification

MODEL:	Intrepid FlexBurn®
LABORATORY:	OMNI Test Laboratories, Inc
REPORT NO.	0135WS038
TYPE:	Solid Fuel Type Room Heaters
STANDARD(s):	UL-1482, ULC-S627, UL737

The Intrepid FlexBurn® Wood Appliance meets the U.S. Environmental Protection Agency's crib wood emission limits for wood appliances sold after May 15, 2020.

This wood appliance needs periodic inspection and repair for proper operation. It is against federal regulations to operate this wood appliance in a manner inconsistent with operating instructions in this manual.

B. BTU & Efficiency Specifications

EPA Certification #:	0135WS0385
EPA Certified Emissions:	.6g/hr (without catalyst) .3 g/hr (catalytic)
*LHV Tested Efficiency:	80.3% (without catalyst) 76.7% (catalytic)
**HHV Tested Efficiency:	74.3% (without catalyst) 76.7% (catalytic)
***EPA BTU Output:	13,039 - 17,847 (without catalyst) 14,544 - 15,900 (catalytic)
****Peak BTU/Hour Output:	36,900 (without catalyst) 34,900 (catalytic)
Vent Size:	6 Inch (152 mm)
Firebox Size:	1.3 cu. ft.
Max. Wood Length:	16" Maximum
Fuel Orientation:	East, West
Fuel	Seasoned Cordwood (20% moisture)
* Weighted average LHV efficiency using Douglas Fir dimensional lumber and data collected during EPA emissions test.	
**Weighted average HHV efficiency using Douglas Fir dimensional lumber and data collected during EPA emissions test.	
***Efficiencies are based on test results calculated using B415; these calculated efficiencies are then used to calculate output BTU's.	
****A peak BTU out of the appliance calculated using the maximum first hour burn rate from the High EPA Test and the BTU content of cord wood (8600) times the efficiency.	

C. Mobile Home Approved (USA ONLY)

- This appliance is approved for mobile home installations in the USA when not installed in a sleeping room and when an outside combustion air inlet is provided.
- The structural integrity of the mobile home floor, ceiling, and walls must be maintained.
- The unit must be bolted to the floor. This can be done using an appropriate fastener for the application.
- The appliance must be properly grounded to the frame of the mobile home with #8 copper ground wire, and chimney must be listed to UL103 HT or a listed UL-1777 full length six" (152mm) diameter liner must be used.
- Outside Air Kit, part 0003265 must be installed in a mobile home installation.
- Mobile Home Bracket Kit #0003264 must be installed in a mobile home installation.

D. Glass Specifications

This appliance is equipped with 5mm ceramic glass. Replace glass only with 5mm ceramic glass. Please contact your dealer for replacement glass.

 WARNING	
	<p>Fire Risk. Hearth & Home Technologies disclaims any responsibility for, and the warranty will be voided by, the following actions:</p> <ul style="list-style-type: none"> • Installation and use of any damaged appliance. • Modification of the appliance. • Installation other than as instructed by Hearth & Home Technologies. • Installation and/or use of any component part not approved by Hearth & Home Technologies. • Operating appliance without fully assembling all components. • Operating appliance without legs attached (if supplied with it). • Do NOT Over fire - If appliance or chimney connector glows, you are over firing. <p>Any such action that may cause a fire hazard.</p>

NOTE: This installation must conform with local codes. In the absence of local codes you must comply with the UL1482-11, UL 737-11, (UM) 84-HUD and NPFA211 in the U.S.A. and the ULC S627-00 and CAN/CSA-B365 Installation Codes in Canada. **NOT APPROVED FOR MOBILE HOME INSTALLATIONS IN CANADA!**

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage.

For assistance or additional information, consult a qualified installer, service agency or your dealer.

NOTE: Hearth & Home Technologies, manufacturer of this appliance, reserves the right to alter its products, their specifications and/or price without notice.

Hearth & Home Technologies **WILL NOT** warranty appliances that exhibit evidence of over-firing. Evidence of over-firing includes, but is not limited to:

- Warped Damper
- Deteriorated refractory
- Deteriorated interior components

E. Non-Combustible Materials

Material which will not ignite and burn, composed of any combination of the following:

- | | |
|------------|-----------|
| - Steel | - Plaster |
| - Brick | - Iron |
| - Concrete | - Tile |
| - Glass | - Slate |

Materials reported as passing **ASTM E 136, Standard Test Method for Behavior of Metals, in a Vertical Tube Furnace of 750° C.**

F. Combustible Materials

Material made of/or surfaced with any of the following materials:

- | | |
|----------------|------------------------|
| - Wood | - Compressed Paper |
| - Plant Fibers | - Plastic |
| - Plywood/OSB | - Sheet Rock (drywall) |

Any material that can ignite and burn: flame proofed or not, plastered or non-plastered.

2 Getting Started

A. Design and Installation Considerations

Consideration must be given to:

- Safety
- Convenience
- Traffic flow
- Chimney and chimney connector required

It is a good idea to plan your installation on paper, using exact measurements for clearances and floor protection, before actually beginning the installation. If you are not using an existing chimney, place the appliance where there will be a clear passage for a factory-built listed chimney through the ceiling and roof.

We recommend that a qualified building inspector and your insurance company representative review your plans before and after installation.

If this appliance is in an area where children may be near it is recommended that you purchase a decorative barrier to go in front of the appliance. Remember to always keep children away while it is operating and do not let anyone operate this appliance unless they are familiar with these operating instructions.

CAUTION

Check building codes prior to installation.

- Installation **MUST** comply with local, regional, state and national codes and regulations.
- Consult insurance carrier, local building, fire officials or authorities having jurisdiction about restrictions, installation inspection, and permits.

WARNING



Asphyxiation Risk

- **DO NOT CONNECT THIS APPLIANCE TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE.**
- **DO NOT CONNECT TO ANY AIR DISTRIBUTION DUCT OR SYSTEM.**

May allow flue gases to enter the house.

B. Fire Safety

To provide reasonable fire safety, the following should be given serious consideration:

1. Install at least one smoke detector on each floor of your home to ensure your safety. They should be located away from the heating appliance and close to the sleeping areas. Follow the smoke detector manufacturer's placement and installation instructions, and be sure to maintain regularly.

2. A conveniently located Class A fire extinguisher to contend with small fires resulting from burning embers.
3. A CO detector should be installed in the room with the appliance.
4. A practiced evacuation plan, consisting of at least two escape routes.
5. A plan to deal with a chimney fire as follows:
In the event of a chimney fire:
 - a. Evacuate the house immediately
 - b. Notify fire department.

Notice: Hearth & Home Technologies assumes no responsibility for the improper performance of the appliance system caused by:

- Inadequate draft due to environmental conditions
- Down drafts
- Tight sealing construction of the structure
- Mechanical exhausting devices
- Over drafting caused by excessive chimney heights
- Ideal performance is with height of chimney between 16 Feet (4.88m) measured from the base of the appliance.

C. Negative Pressure

WARNING



Asphyxiation Risk

- Negative pressure can cause spillage of combustion fumes, soot and carbon monoxide.
- Appliance needs to draft properly for safety.

Negative pressure results from the imbalance of air available for the appliance to operate properly. It can be strongest in lower levels of the house.

Causes include:

- Exhaust fans (kitchen, bath, etc.)
- Range hoods
- Combustion air requirements for furnaces, water appliances and other combustion appliances
- Clothes dryers
- Location of return-air vents to furnace or air conditioning
- Imbalances of the HVAC air handling system
- Upper level air leaks such as:
 - Recessed lighting
 - Attic hatch
 - Duct leaks

To minimize the effects of negative air pressure:

- Install the outside air kit with the intake facing prevailing winds during the heating season
- Ensure adequate outdoor air for all combustion appliances and exhaust equipment
- Ensure furnace and air conditioning return vents are not located in the immediate vicinity of the appliance
- Avoid installing the appliance near doors, walkways or small isolated spaces
- Recessed lighting should be a “sealed can” design
- Attic hatches weather stripped or sealed
- Attic mounted duct work and air handler joints and seams taped or sealed
- Basement installations should be avoided

 **WARNING**



Fire Risk.

Hearth & Home Technologies disclaims any responsibility for, and the warranty will be voided by, the following actions:

- Installation and use of any damaged appliance.
- Modification of the appliance.
- Installation other than as instructed by Hearth & Home Technologies.
- Installation and/or use of any component part not approved by Hearth & Home Technologies.
- Operating appliance without fully assembling all components.
- Operating appliance without legs attached (if supplied with appliance).
- Do NOT Over fire - If appliance or chimney connector glows, you are over firing.

Any such action that may cause a fire hazard.

D. Tools And Supplies Needed

Before beginning the installation be sure the following tools and building supplies are available:

- | | |
|---|-------------------------------|
| • Reciprocating saw | • Framing material |
| • Pliers | • High temp caulking material |
| • Hammer | • Gloves |
| • Phillips screwdriver | • Framing square |
| • Flat blade screwdriver | • Electric drill and bits |
| • Plumb line | • Safety glasses |
| • Level | • Tape measure |
| • Misc. screws and nails | |
| • 1/2-3/4 in. length, #6 or #8 self-drilling screws | |

E. Inspect Appliance and Components

- Remove appliance and components from packaging and inspect for damage.
- Report to your dealer any parts damaged in shipment.
- **Read all the instructions before starting the installation. Follow these instructions carefully during the installation to ensure maximum safety and benefit.**

 **WARNING**



Fire Risk

Inspect appliance and components for damage. Damaged parts may impair safe operation.

- Do NOT install damaged components.
- Do NOT install incomplete components.
- Do NOT install substitute components.

Report damaged parts to dealer.

F. Install Checklist

**ATTENTION INSTALLER:
Follow this Standard Work Checklist**

This standard work checklist is to be used by the installer in conjunction with, not instead of, the instructions contained in this installation manual

Customer: _____

Date Installed: _____

Lot/Address: _____

Location of Appliance: _____

Installer: _____

Dealer/ Distributor Phone #: _____

Serial #: _____

Model : _____

WARNING! Risk of Fire or Explosion! Failure to install appliance according to these instructions can lead to a fire or explosion.

Appliance Install

Verified clearance to combustibles.

Appliance is leveled and connector is secured to appliance.

Hearth extension size/height decided.

Outside Air Kit Installed.

Floor protection requirements have been met.

If appliance is connected to a masonry chimney, it should be cleaned and inspected by a professional. If installed to a factory built metal chimney, the chimney must be installed according to the manufacturer's instructions and clearances.

YES IF NO, WHY?

YES	IF NO, WHY?
<input type="checkbox"/>	_____

Chimney

Chimney configuration complies with diagrams.

Chimney installed, loked and secured in place with proper clearance.

Chimney meets recommended height requirements (16 Feet).

Roof flashing installed and sealed.

Terminations installed and sealed.

<input type="checkbox"/>	_____

Clearances

Combustible materials not installed on non-combustible areas.

Verified all clearances meet installation manual requirements.

Mantels and wall projections comply with installation manual requirements.

Protective hearth strips and hearth extensions installed per manual requirements.

<input type="checkbox"/>	_____

Appliance Setup

All packaging and protective materials removed.

Firebrick, baffle and ceramic blanket insalled correctly

All labels have been removed from the door.

All packaging materials are removed from inside/under the appliance.

Manual bag and all of its contents are removed from inside/under the appliance and given to the party responsible for use and operation.

<input type="checkbox"/>	_____

Hearth & Home Technologies recommends the following:

- Photographing the installation and copying this checklist for your file.
- That this checklist remain visible at all times on the appliance until the installation is complete.

Comments: Further description of the issues, who is responsible (Installer/Builder/Other Trades, etc.) and corrective action needed:

Comments communicated to party responsible _____ by _____ on _____
(Builder/Gen. Contractor) (Installer) (Date)

3 Dimensions and Clearances

A. Appliance Dimensions

NOTE: Flue Collar size is 6" (152mm) diameter (ID)

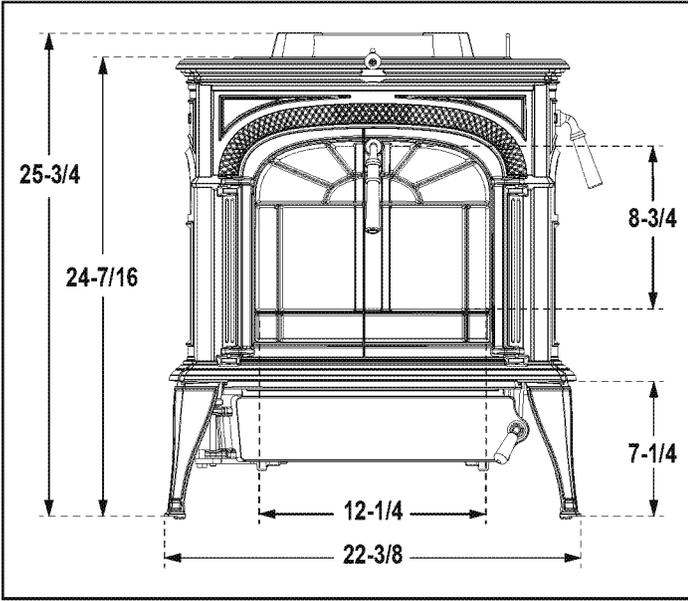


Figure 3.1 - Front View

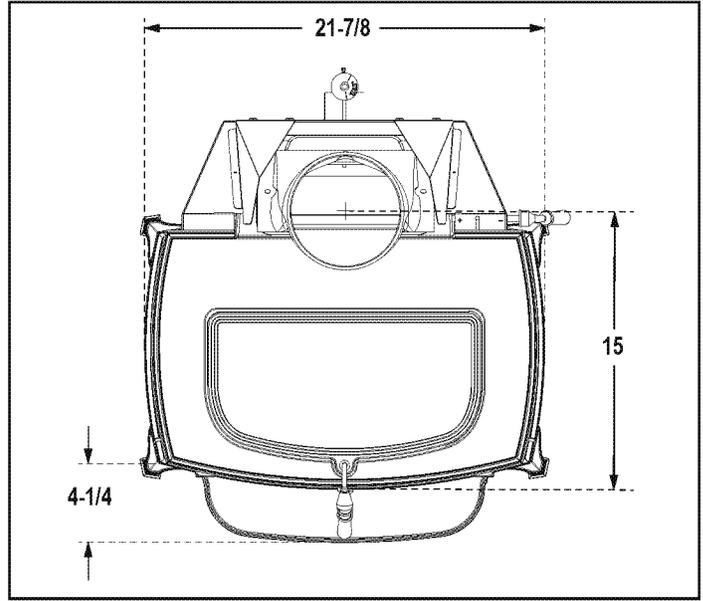


Figure 3.2 - Top View

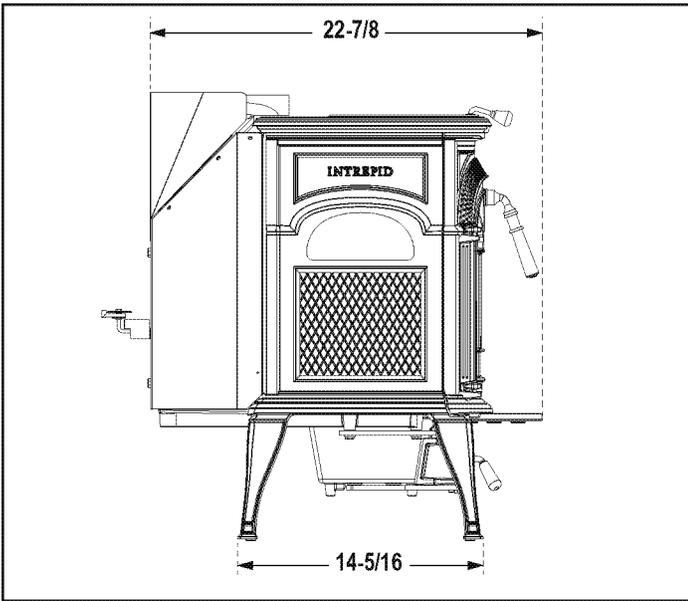


Figure 3.2 - Side View

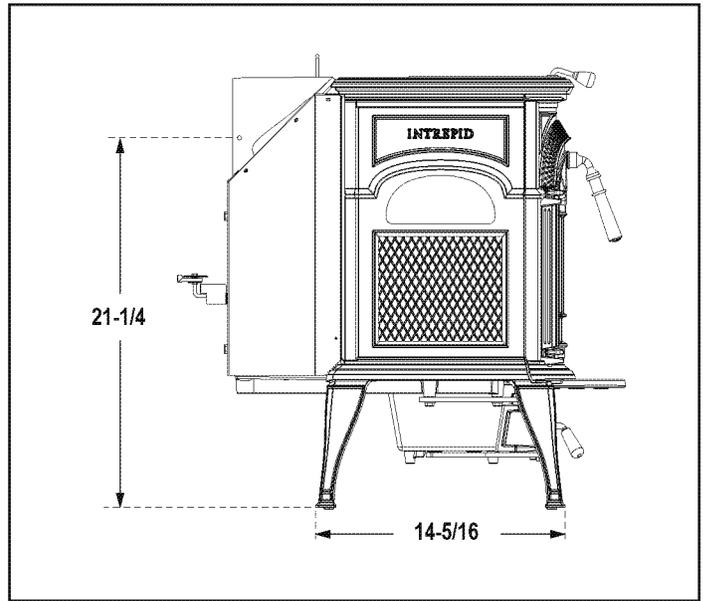


Figure 3.4 - Side View with horizontal flue

B. Hearth Protection Requirements

FLOOR PROTECTION: It is necessary to install a Type I floor protector.

Floor protector must be non-combustible material of a minimum of 3/8" (10 mm) thick, with a minimum R value of 1.06 extending under the appliance to a minimum of 16" (406 mm) in front of glass, and 8" (203 mm) to both sides of the fuel loading door. Open the door and measure 8" (203 mm) from the side edge of the opening in the face of the appliance. *See exception.

In Canada, similar floor protection must be provided 18" (457 mm) in front and 8" (203 mm) from the sides and rear of the appliance. Figure 3.8

***EXCEPTION:** Non-combustible floor protections must extend beneath the flue pipe when installed with horizontal venting and extend 2" (51 mm) beyond each side. See Figure 3.8.

 WARNING	
	Fire Risk
	Hearth pads must be installed exactly as specified. High temperatures or hot embers may ignite concealed combustibles.

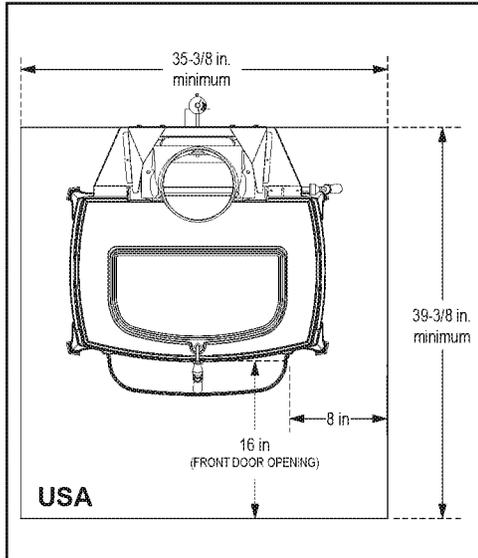


Figure 3.5

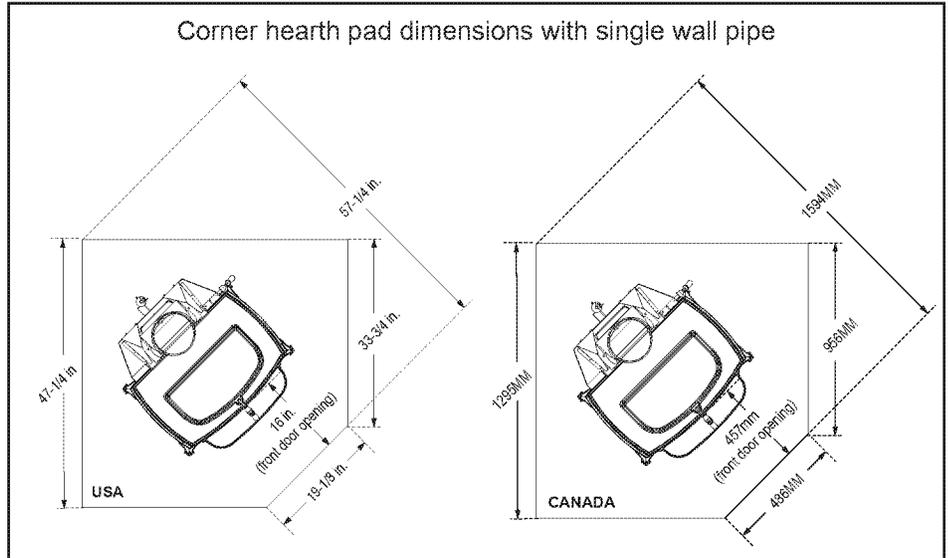


Figure 3.6

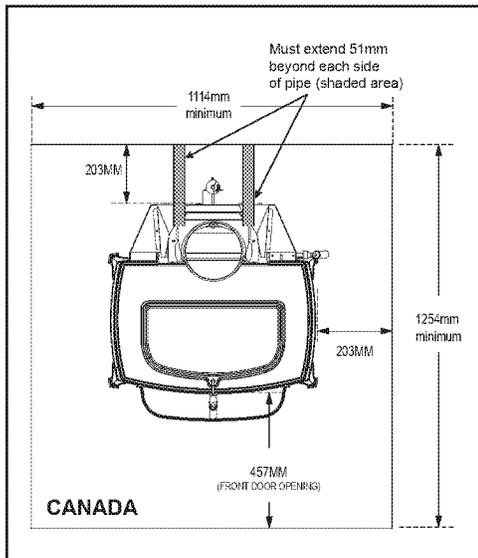


Figure 3.7

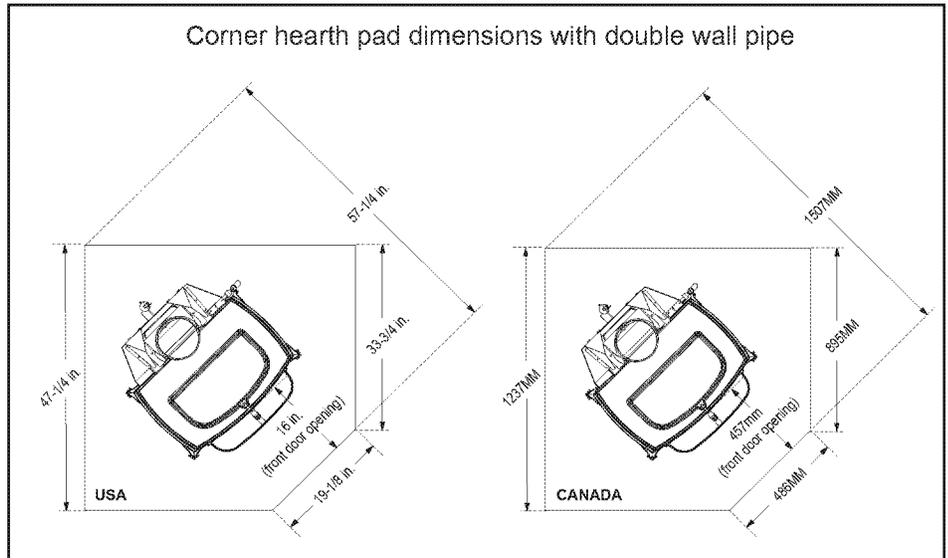


Figure 3.8

C. Clearances to Combustibles

MINIMUM CLEARANCES TO COMBUSTIBLE MATERIALS

Note: A, C and F Dimensions are to the center of the flue collar

INSTALLATION: FULL VERTICAL

	A	B	C	D	E	F	G	H*
Single Wall Pipe								
Double Wall Pipe								

INSTALLATION: 90 DEGREE ELBOW OFF TOP OF APPLIANCE THROUGH BACK WALL

Double Wall Pipe								
------------------	--	--	--	--	--	--	--	--

INSTALLATION: HORIZONTAL THROUGH THE WALL

Single Wall Pipe								
------------------	--	--	--	--	--	--	--	--

For Factory Alcove: Six" diameter listed Double wall air insulated connector pipe with UL103 HT listed factory built Class A Chimney or Masonry chimney. Maximum depth Alcove shall be no more than 48" (1219 mm) and the referenced Alcove clearances. Canada must comply with CAN/ULC-S269 M87 for the 650° factory built chimney.

*Follow pipe manufacturers clearances as required.

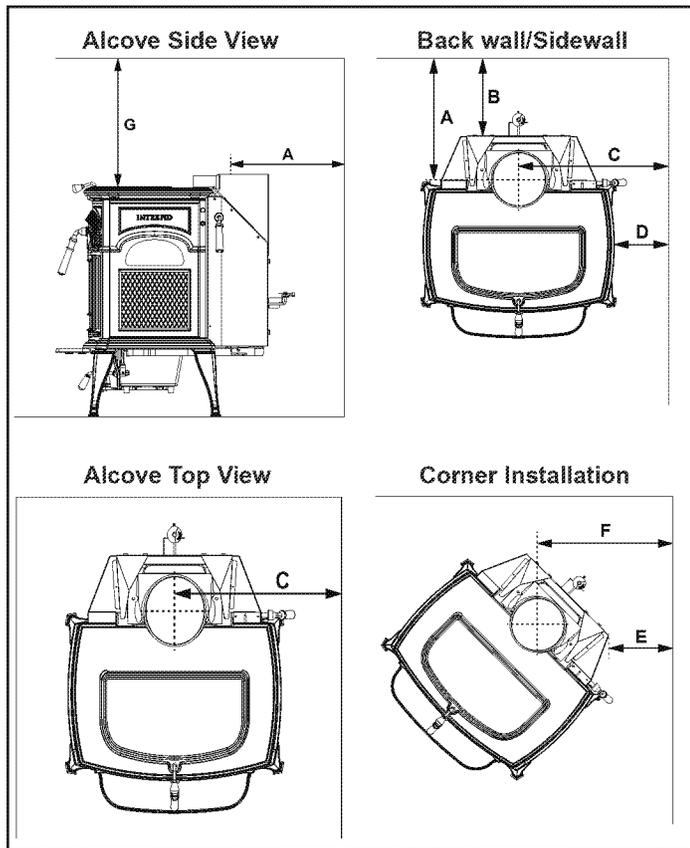


Figure 3.9

WARNING

Fire Risk

- Comply with all minimum clearances to combustibles as specified.
- Failure to comply may cause house fire.

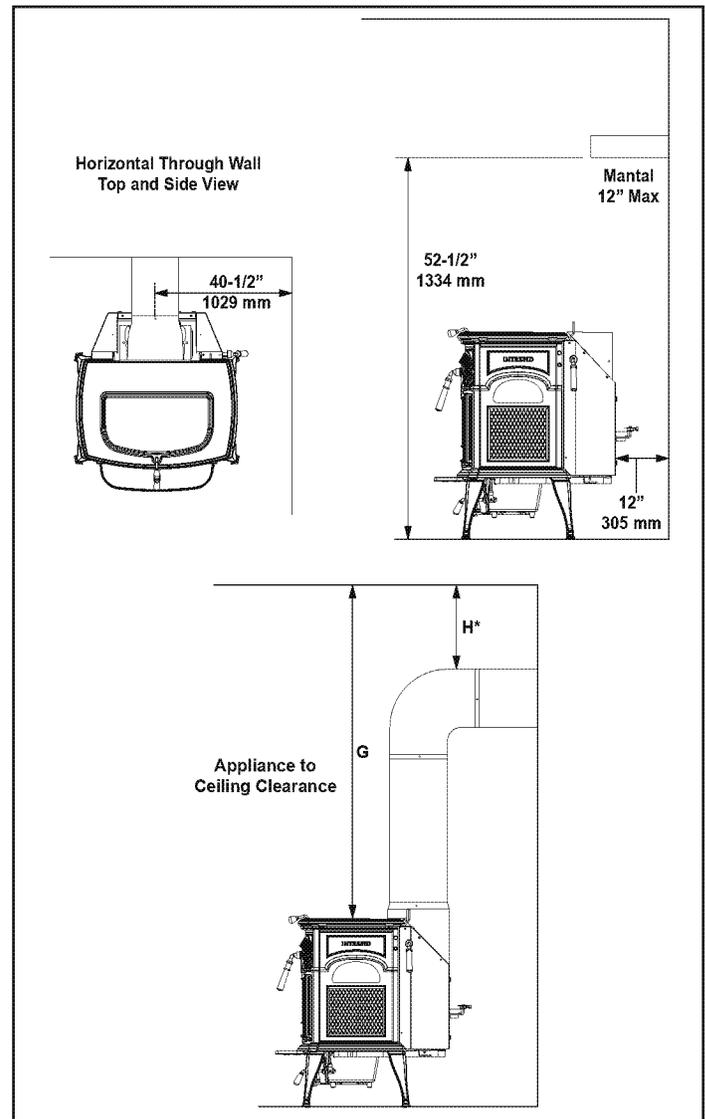


Figure 3.10

D. Locating Your Appliance & Chimney

Location of the appliance and chimney will affect performance. As shown in Figure 3.11 the chimney should:

- Install through the warm space enclosed by the building envelope. This helps to produce more draft, especially during lighting and die down of the fire.
- Penetrate the highest part of the roof. This minimizes the affects of wind turbulence and down drafts.

- Consider the appliance location in order to avoid floor and ceiling attic joists and rafters.
- Locate termination cap away from trees, adjacent structures, uneven roof lines and other obstructions.

Your local dealer is the expert in your geographic area and can usually make suggestions or discover solutions that will easily correct your flue problem.

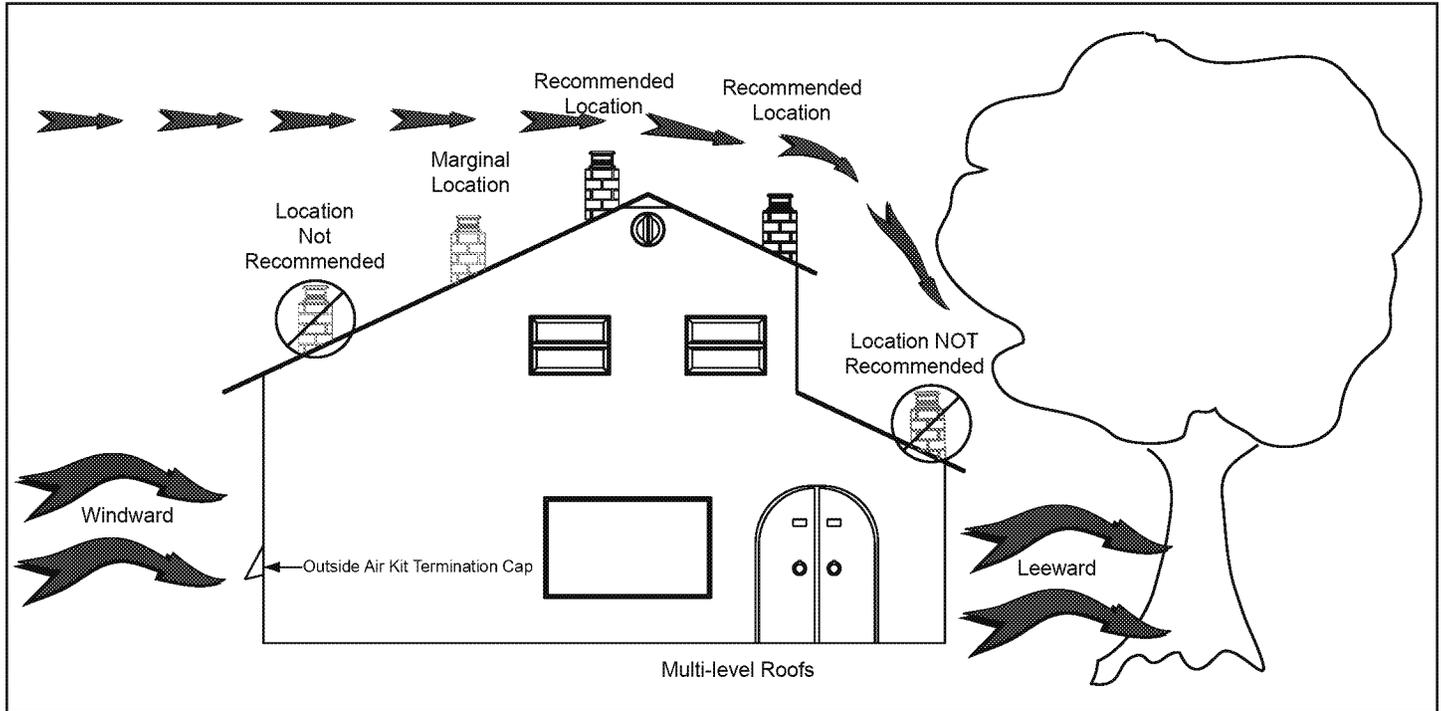


Figure 3.11

E. Chimney Termination Requirements

Follow manufacturer's instructions for clearance, securing flashing and terminating the chimney. Figures 3.12 & 3.13.

- Must have an approved and Listed cap
- Must not be located where it will become plugged by snow or other material
- Must terminate at least 3 feet (91 cm) above the roof and at least 2 feet (61 cm) above any portion of the roof within 10 feet (305 cm).
- Must be located away from trees or other structures

NOTICE:

- Chimney performance may vary.
- Trees, buildings, roof lines and wind conditions affect performance.
- Chimney height may need adjustment if smoking or overdraft occurs.

NOTICE: Locating the appliance in a basement or in a location of considerable air movement can cause intermittent smoke spillage from appliance. Do not locate appliance near

- Frequently open doors
- Central heat outlets or returns

F. Chimney Location (2-10-3 Rule)

These are safety requirements and are not meant to assure proper flue draft.

This appliance is made with a 6" (152 mm) diameter chimney connector as the flue collar on the appliance.

- Changing the diameter of the chimney can affect draft and cause poor performance.
- It is not recommended to use offsets and elbows at altitudes above 4000 feet above sea level and or when there are other factors that affect flue draft.

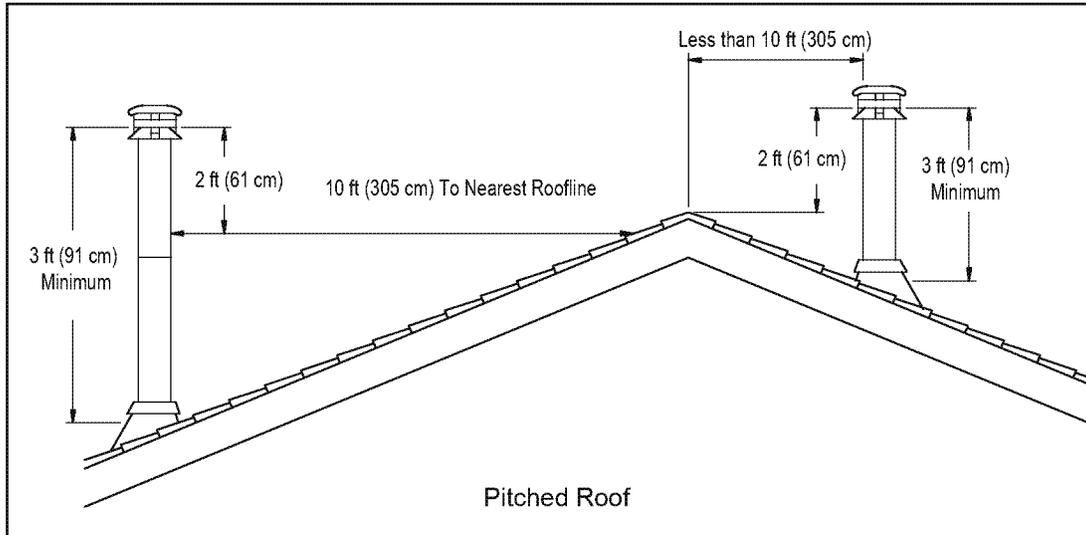


Figure 3.12

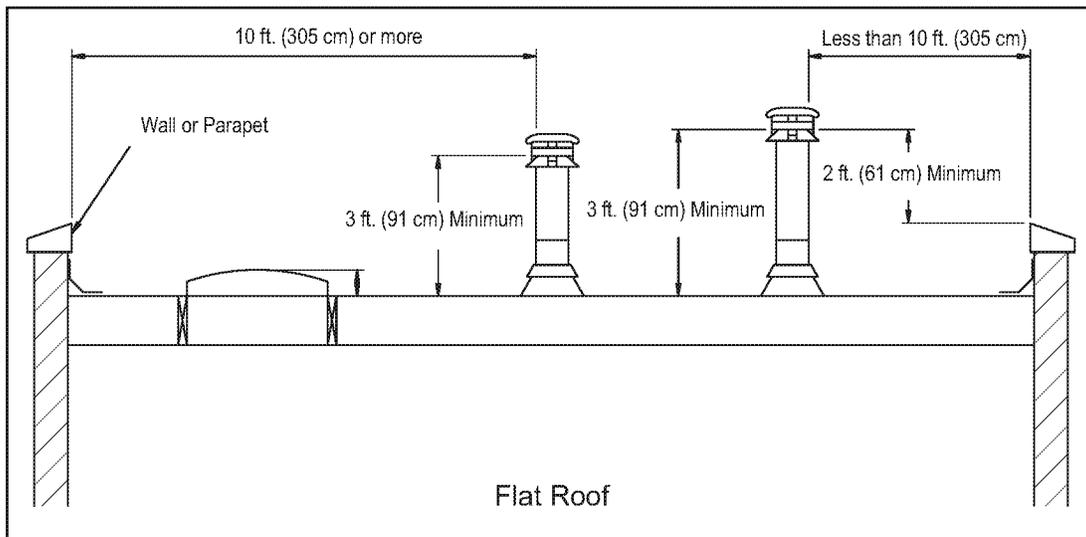


Figure 3.13

4 Chimneys & Venting

A. Venting & Draft Management

A stove is part of a system, which includes the chimney, the operator, the fuel, and the home. The other parts of the system will affect how well the stove works. When there is a good match between all the parts, the system works well.

Wood stove or insert operation depends on natural (unforced) draft. Natural draft occurs when the exhaust is hotter (and therefore lighter) than the outdoor air at the top of the chimney. The bigger the temperature difference, the stronger the draft. As the hot gases rise through the chimney they provide suction or 'draw' that pulls air into the stove for combustion. A slow, lazy fire with the stove's air inlets fully open indicates a weak draft. A brisk fire, supported only by air entering the stove through the normal inlets, indicates a good draft. The stove's air inlets are passive; they regulate how much air can enter the stove, but they don't move air into it.

Depending on the features of your installation - steel or masonry chimney, inside or outside the house, matched to the stove's outlet or oversized - your system may warm up quickly, or it may take a while to warm up and operate well. With an 'airtight' stove, one which restricts the amount of air getting into the firebox, the chimney must keep the stove's exhaust warm all the way to the outdoors in order for the stove to work well. Some chimneys do this better than others. Here's a list of features and their effects.

Masonry Chimney

Masonry is a traditional material for chimneys, but it can perform poorly when it serves an 'airtight' stove. Masonry is a very effective 'heat sink' - it absorbs a lot of heat. It can cool the chimney gases enough to diminish draft. The bigger the chimney, the longer it takes to warm up. It's often very difficult to warm up an outdoor masonry chimney, especially an oversized one, and keep it warm enough to maintain an adequate draft.

Steel Chimney

Most factory-made steel chimneys have a layer of insulation around the inner flue. This insulation keeps the chimney warm. The insulation is less dense than masonry, so a steel chimney warms up more quickly than a masonry chimney. Steel doesn't have the good looks of masonry, but it performs much better.

Indoor/Outdoor Location

Because the chimney must keep the smoke warm, it's best to locate it inside the house. This uses the house as insulation for the flue and allows some heat release into the home. An indoor chimney won't lose its heat to the outdoors, so it takes less heat from the stove to heat it up and keep it warm.

Single Venting

Each 'airtight' stove requires its own flue. If an airtight stove is vented to a flue that also serves an open fireplace, or a leakier stove, it's easier for the chimney draft to pull air in through those channels and performance of the stove suffers. Imagine a vacuum cleaner with a hole in the hose to understand the effect here. In some cases the other appliance can even cause a negative draft through the stove, and result in a dangerous draft reversal.

Chimney Height

The common wisdom tells us that a taller flue draws better than a short one. This isn't necessarily so. If a chimney is tall enough to meet the safety requirements of the 2/3/10 foot rule, then adding more height isn't the right answer to a draft problem. In fact it could make the problem worse by adding more mass to the chimney system, which must be warmed up, a distance from the heat source (the stove). Don't make a chimney taller unless you must in order to meet the safety rules, or unless there's some nearby feature causing a downdraft. Even then, there are downdraft-preventing chimney caps available, which are probably the smarter choice.

Flue Sizing

The inside size of a chimney for an 'airtight' stove should match the size of the stove's flue outlet. When a chimney serves an airtight stove, more is not better; in fact, it can be a disadvantage. Hot gases lose heat faster as they travel slower through a chimney; if we vent a stove with a six-inch flue collar (28 square inch area) into a 10 x 10" flue, the gases slow to one third their original speed. This allows the gases to cool more rapidly, which weakens draft strength. If an oversized flue is also outside the house, the heat it absorbs gets transferred to the outdoor air and the flue usually stays cool.

It is common for a masonry flue, especially one serving a fireplace, to be oversized for the stove. It can take quite a while to warm up such a flue, and the results can be disappointing. The best solution to an oversized flue is an insulated steel chimney liner, the same diameter as the stove or inserts flue outlet; the liner keeps the exhaust warm, and the result is a stronger draft. A non-insulated liner is a second choice - the liner keeps the exhaust restricted to its original size, but the hot gases still must warm up the air around the liner. This makes the warm-up process take longer.

Pipe & Chimney Layout

Every turn the exhaust must take as it travels to the chimney top will slow it down. The ideal pipe and chimney layout is to vent vertically into a completely straight and vertical chimney. If you are starting from scratch, use this layout if possible. If the stovepipe must elbow to enter a chimney, locate the thimble about midway between the stove top and the ceiling. This achieves several goals: it allows the gases to speed up before they must turn, it leaves some pipe in the room for heat transfer, and it gives you long-term flexibility for installing a different stove without relocating the thimble.

There should be no more than eight feet of single-wall stove pipe between the stove and a chimney; longer runs can cool the exhaust enough to cause draft and creosote problems. With prefabricated chimney, bring it down to six to eight feet from the stove. With a masonry chimney, arrange the pipe so that it turns into the chimney within eight feet of the stove.

B. Venting Components

Chimney Connector: It is also known as flue pipe or appliance pipe. The chimney connector joins the appliance to the chimney. It must be a 6" (152 mm) minimum diameter 24 gauge mild steel black or 26 gauge blued steel, or an approved air-insulated double wall venting pipe.

Thimble: A manufactured or site-constructed device installed in combustible walls through which the chimney connector passes to the chimney. It is intended to keep the walls from igniting. Site constructed thimbles must meet NFPA 211 Standards. Prefabricated must be suitable for use with selected chimney and meet UL103 Type HT Standards. Follow instructions provided by the manufacturer for manufactured thimbles for masonry chimney and prefabricated chimneys.

Chimney: The chimney can be new or existing, masonry or prefabricated and must meet the following minimum requirements specified in Section 4B.

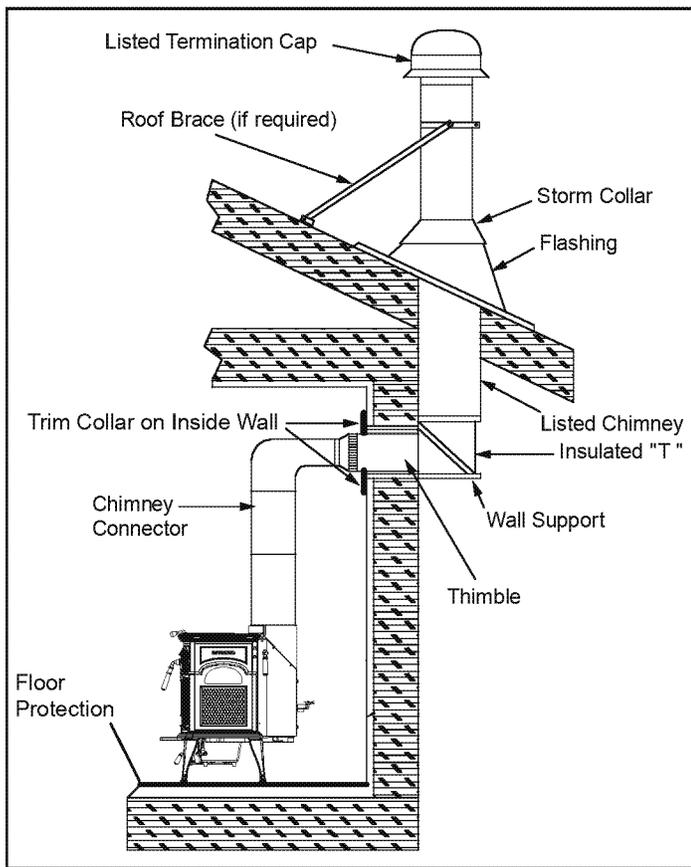


Figure 4.1 - Prefabricated Exterior Chimney

C. Chimney Systems

Prefabricated Metal Chimney

- Must be minimum 6" (152 mm) diameter (ID) high temperature chimney listed to UL 103 HT (2100 °F) or ULC S629M.
- Must use components required by the manufacturer for installation.
- Must maintain clearances required by the manufacturer for installation.
- Refer to manufacturers instructions for installation.

NOTE: In Canada when using a factory-built chimney it must be safety listed, **Type UL103 HT (2100 °F) CLASS "A"** or conforming to **CAN/ULC-S629M, STANDARD FOR 650 °C FACTORY-BUILT CHIMNEYS.**

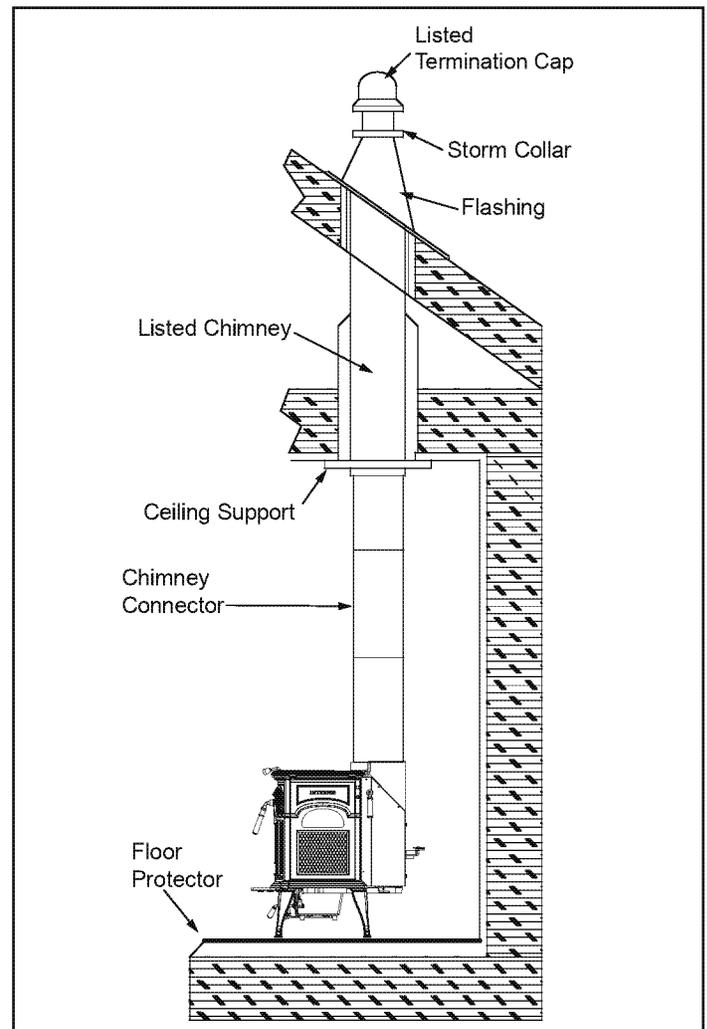


Figure 4.2 - Prefabricated Interior Chimney

Thimble

Site constructed for masonry chimney installation:

Components

- A minimum length of 12" (305 mm) (longer for thicker walls) of solid insulated factory-built chimney length constructed to UL 103 Type HT 6" (152 mm) inside diameter. Chimney needs to extend a minimum of 2" (51 mm) from the interior wall and a minimum of 1" (25 mm) from the exterior wall.
- Wall spacer, trim collar and wall band to fit solid pack chimney selected.
- Minimum 8" (203 mm) diameter clay liner section (if not already present in chimney) and refractory mortar.
- When jurisdiction requires install approved chimney liner in masonry chimney.

Air Clearances

- Masonry chimney clearance must meet NFPA 211 minimum requirement of 2" (51 mm) to sheet metal supports and combustibles.
- Minimum of 1" (25 mm) clearance around the chimney connector.
- Top of wall opening is a minimum of 13-1/2" (343 mm) from ceiling or 4-1/2" (114 mm) below minimum clearance specified by chimney connector manufacturer. NFPA 211 minimum vertical clearance of 18" (457mm) from chimney connector and ceiling or minimum recommended by chimney connector manufacturer. Figure 4.3

Instructions

1. Open inside wall at proper height for the chimney connector to enter the masonry chimney. Figure 4.3
2. Entry hole to masonry chimney must be lined with an 8" (203 mm) minimum diameter clay liner, or equivalent, secured with refractory mortar.
3. Construct a 17" x 17" (432 mm x 432 mm) outside dimension frame from 2 x 2 framing lumber to fit into wall opening. Inside opening of frame should be no less than 14" x 14" (356 mm x 356 mm). Figure 4.4. Attach the wall spacer to the chimney side of the frame.
5. Nail the frame into the wall opening. The spacer should be on the chimney side.
6. Insert the section of the solid insulated chimney into the outer wall of the masonry chimney.
7. Tightly secure the length of the solid insulated chimney with the wall band to the masonry chimney.
8. Insert a section of chimney connector into the chimney. Make sure it does not protrude past the edge of the clay chimney liner inside the chimney.
9. Seal the end of the chimney connector to the clay liner with refractory mortar.
10. Install trim collar around the sold pack chimney section.

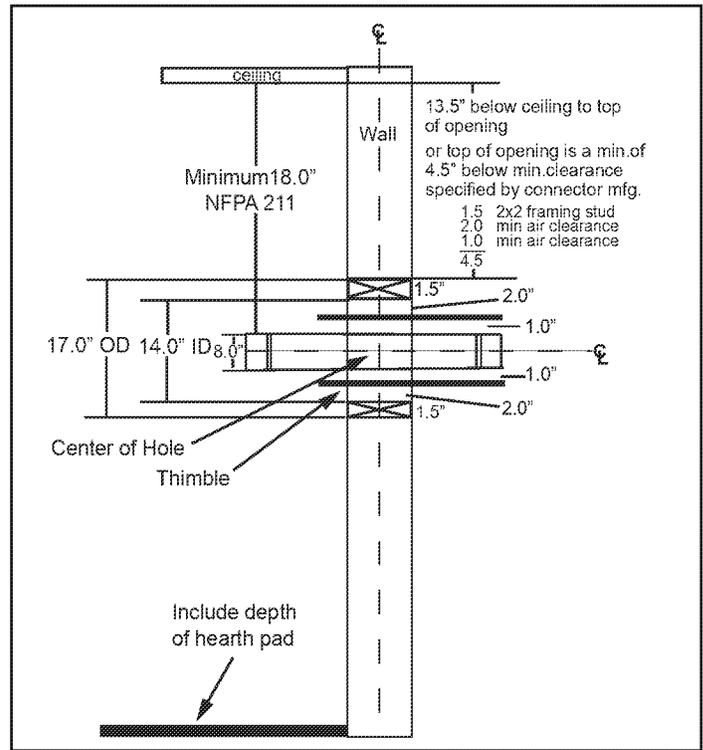


Figure 4.3

Solid Pack Chimney with Metal Supports as a Thimble

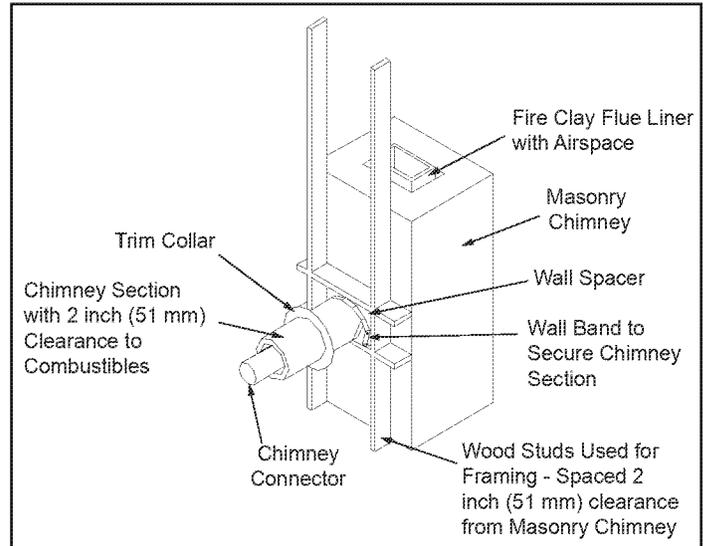


Figure 4.4



WARNING



Fire Risk

Do NOT pack insulation or other combustibles between spacers.

- ALWAYS maintain specified clearances around venting and spacers.
- Install spacers as specified.

Failure to keep insulation or other material away from vent pipe may cause fire.

Solid Pack Chimney with Metal Supports as a Thimble (Cont'd)

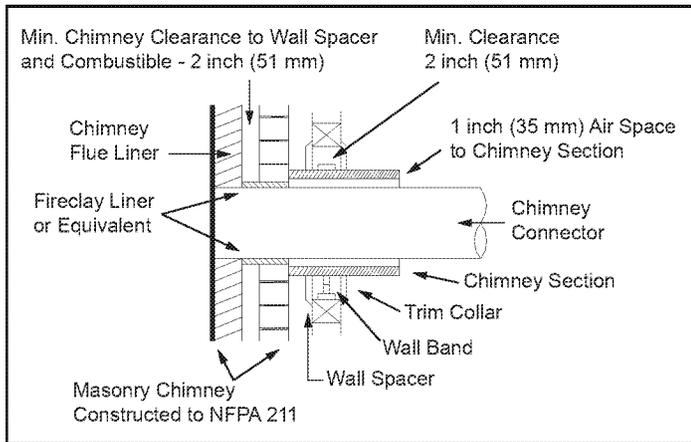


Figure 4.5

Chimney Height / Rise and Run

This product was designed for and tested on a 6" (152mm) chimney, 16 feet (4.88m) high, (includes appliance height) measured from the base of the appliance. The further your stack height or diameter varies from this configuration, the possibility of performance problems exists.

Chimney height may need to be increased by 2 - 3% per each 1000 feet above sea level. It is not recommended to use offsets or elbows at altitudes above 4000 feet above sea level or when there are other factors that affect flue draft.

WARNING

Fire Risk

Inspection of Chimney:

- Chimney must be in good condition.
- Meets minimum standard of NFPA 211
- Factory-built chimney must be 6" (152mm) UL103 HT.

WARNING

Asphyxiation Risk

- DO NOT CONNECT THIS Appliance TO A CHIMNEY FLUE SERVICING ANOTHER APPLIANCE.
- DO NOT CONNECT TO ANY AIR DISTRIBUTION DUCT OR SYSTEM.

May allow flue gases to enter the house.

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to the owner's information manual provided with this appliance. For assistance or additional information consult a qualified installer, service agency or your dealer.

D. Installing Chimney Components

Chimney Connector

Single wall connector or appliance pipe

This must be at least 24 gauge mild steel or 26 gauge blue steel. The sections must be attached to the appliance and to each other with the crimped (male) end pointing toward the appliance. All joints, including the connection at the flue collar, should be secured with 3 sheet metal screws. Make sure to follow the minimum clearances to combustibles. Where passage through the wall, or partition of combustible construction is desired in Canada, the installation shall conform to CAN/CSA-B365.

Factory-built (Double-Wall) listed chimney connector

A listed connector (vented) must be used when installing this appliance in a mobile home. The listed connectors must conform to each other to ensure a proper fit and seal.

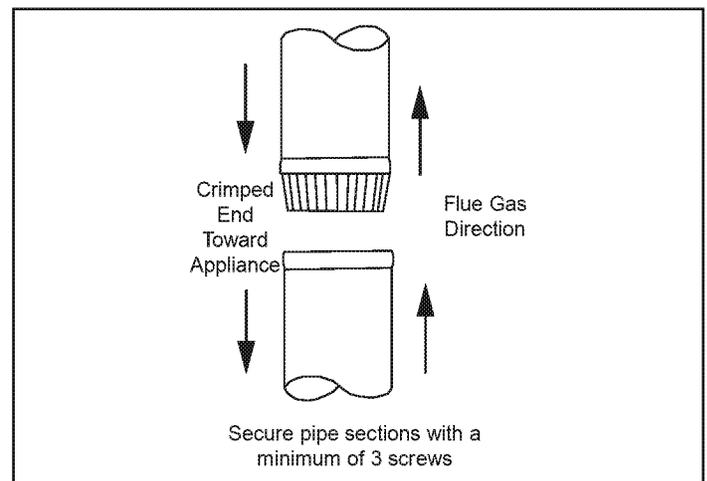


Figure 4.6 - Chimney Connector (Appliance Pipe)

WARNING

Fire Risk

Follow Chimney Connector Manufacturer's Instructions for Proper Installation.

ONLY use connector:

- Within the room, between appliance and ceiling or wall.

Connector shall NOT pass through:

- Attic or roof space
- Closet or similar concealed space
- Floor or ceiling

Maintain minimum clearances to combustibles

5 Appliance Set-Up

A. Removing Unit from Skid

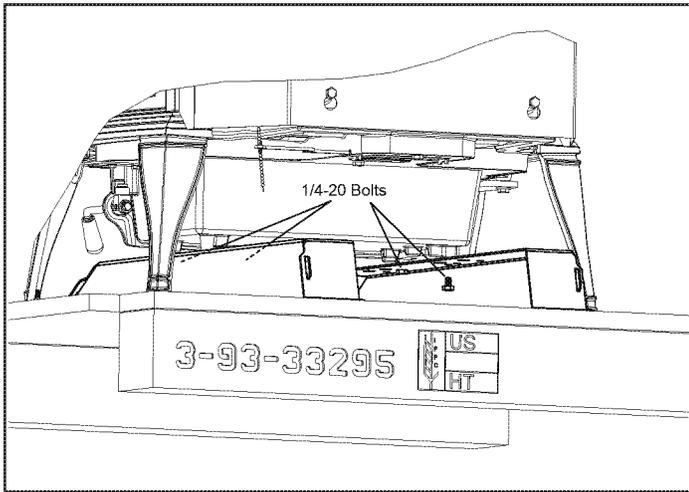


Figure 5.1 - Remove unit from shipping brackets.

Remove the unit from the shipping brackets by removing (2) 1/4-20 hex head bolts from each shipping bracket, leaving brackets attached to the skid. Figure 5.1. (Save the 1/4-20 hex head bolts as they will be needed later to install heat shield.)

NOTE: When moving the stove, lift the stove to take weight off the legs whenever possible. Dragging or sliding the stove, especially across rough surfaces can cause the legs to break.

B. Assembly

Set Up Your Stove

Cast iron stoves are heavy, and it will take two to four people to move your Intrepid FlexBurn® into position.

Wipe the protective coating of oil from the griddle with a clean dry rag or a paper towel.

Install the handle on the griddle. Open front door and push up on griddle and assemble the handle. Figure 5.2.

With the handle pointing 45° from its final position, tighten the nut as far as possible with the pliers. Move the handle to its final position while still holding the nut with the pliers.

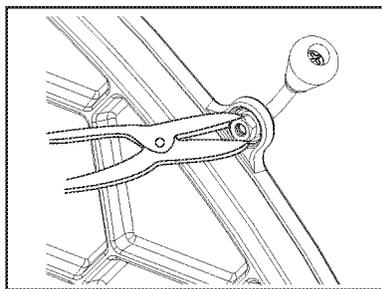


Figure 5.2 - Attach the griddle handle.



CAUTION

Overtightening can strip tapped threads.

Install the Bottom Heat Shield

NOTE: The Bottom Heat Shield is required in most installations. Refer to Floor Protection, in the Dimensions and Clearances Section of this manual for further details.

1. Align the bottom heat shield holes with the four bolts removed from the shipping brackets. The outside air cutout hole should be toward the rear of the stove.
2. Pass all four bolts through the large end of the keyholes and then pulling the shield forward to engage the smaller ends of the keyhole slots. (Figure 5.3)
3. Attach the heat shield sides by passing the slots over the bolt heads. Tighten the hex head bolts.

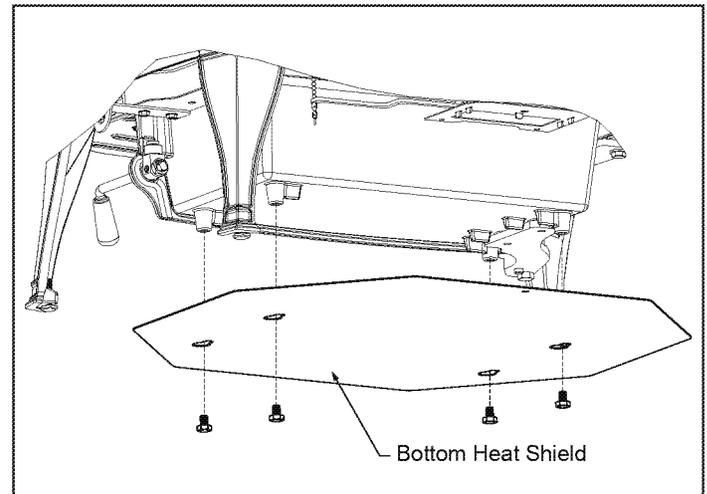


Figure 5.3 - Attach the bottom heat shield.

Adjust the Leg Levelers

Lift the stove slightly so there is no weight on the leg while making the adjustment.



WARNING

The flue collar heat shield must be installed in all vertical installations. The flue collar heat shield is not used when the flue collar is in the rear exit position.

Attach the Damper Handle

Use the 1/4"-20 x 3" screw to attach the damper handle to the damper stub on the left side.

Assemble the Removable Insert Handle

The wooden removable insert handle opens and closes the front doors. Remove after each use, and store it in the handle holder behind the right front leg. Assemble the handle by passing the 3-3/8" screw through the wooden shaft and into the bright metal nub. (Figure 5.5) Tighten carefully until snug.

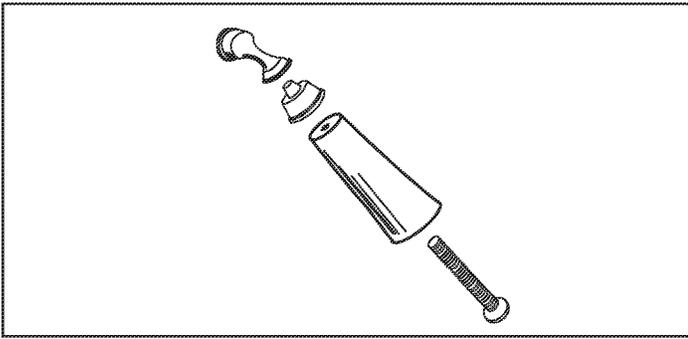


Figure 5.5 - Assemble the front door handle.

Storing the Handle

Use the removable handle to open or close the doors. After using it, remove the handle so it will not get hot. Store the handle in the handle holder installed behind the right front leg. (Figure 5.5)

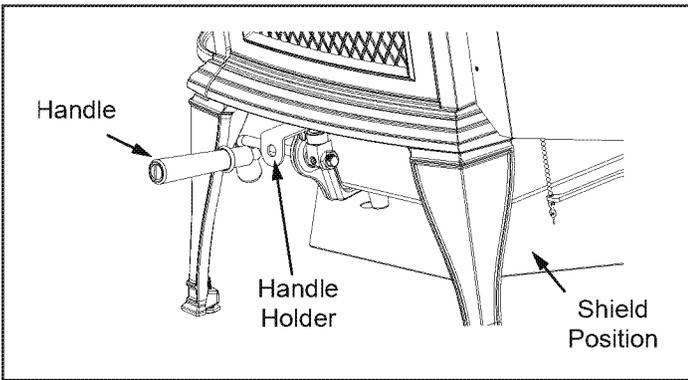


Figure 5.5 - Handle holder and heat shield positions.

C. Installing or Removing Optional Catalyst

1. Locate the access cover positioned at the rear center of the unit. (Figure 5.6)
2. Remove the access cover by pulling straight up and out. (Figure 5.7)
3. Remove the catalyst by gently pulling it up and straight out. (Figure 5.8) Place the catalyst where the catalyst's ceramic components will not be damaged.

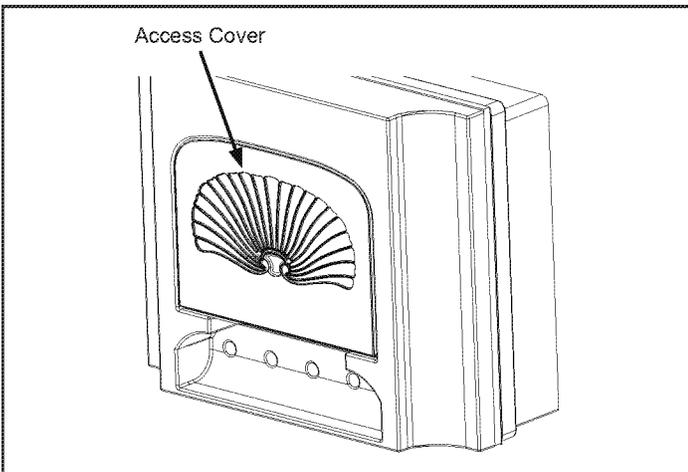


Figure 5.6 - Locate access cover.

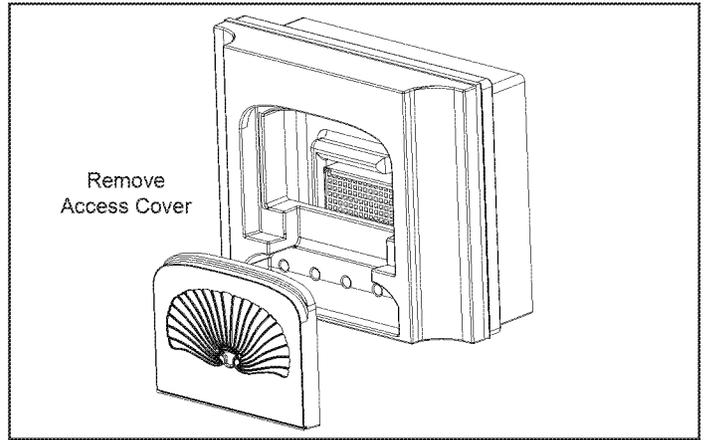


Figure 5.7 - Remove access cover.

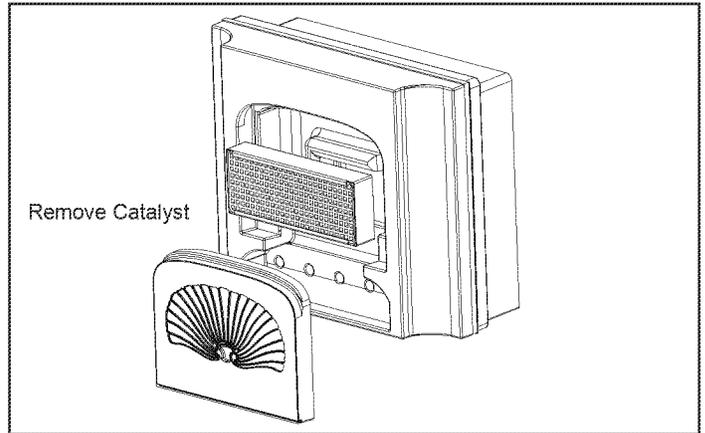


Figure 5.8 - Remove catalyst.

Attach the Catalyst Temperature Probe

If the catalytic performance pack has been purchased, install the catalyst temperature probe, remove the hole plug from the cast iron wall behind the rear shield as shown (Figure 5.9) use two #10 sheet metal screws and bracket supplied, secure the bracket and probe to the back of your stove. (Figure 5.9)

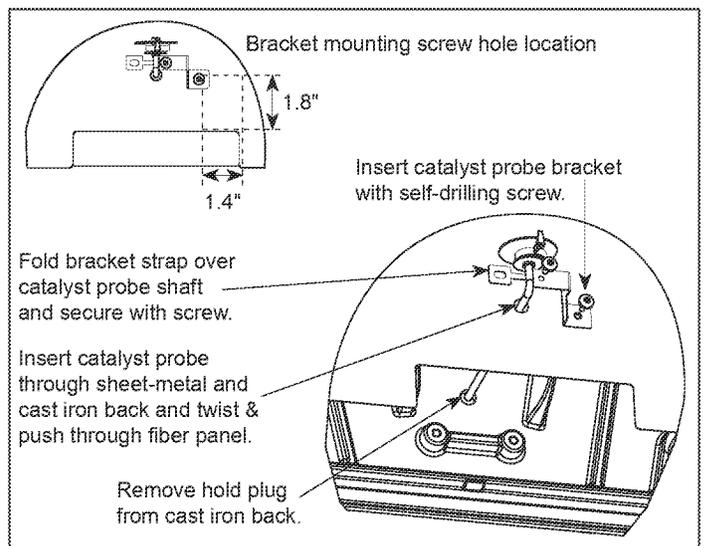


Figure 5.9 - Install the Catalyst Temperature Probe

D. Smoke and CO Detectors & Safety Tips

Smoke and CO Detectors

The use of smoke and carbon monoxide (CO) detectors throughout the home is strongly advised, even if not required by building codes or insurance regulations. It is a good idea to install a smoke detector in the living areas and each bedroom. Follow the smoke/CO detector manufacturer's placement and installation instructions and maintain regularly.

You may not, however, wish to install a detector in the immediate vicinity of the stove. Depending on the sensitivity of the unit, the alarm can be set off while you are tending the fire or emptying the ashes. If you install a detector in the same room, locate it as far away from the stove as possible.

Safety Tips

Conveniently locate a "Class A" fire extinguisher to contend with small fires. Be sure the fire extinguisher works and is clearly visible. All occupants of the house should know where it is, and how it operates. Have heavy stove gloves available near the stove. Have special safety accessories (e.g., Child Guard Screen) available for use if small children will be in the home.

In the event of a stove pipe or chimney fire....

- Evacuate the house immediately
- Notify the fire department
- If the fire isn't too threatening, closing down the stove tight, (damper, primary air, all doors) will help to smother the fire.
- Inspect your stove, vent pipe and chimney for any damage caused by the fire and correct any damage before using your stove again.

E. Optional Fire Screen

An optional fire screen is available for the Intrepid FlexBurn®. Optional Fire Screen Part #0003262 may be used ONLY in U.S. residential installations. Follow all safety warnings to prevent any hazards. Figure 5.10.

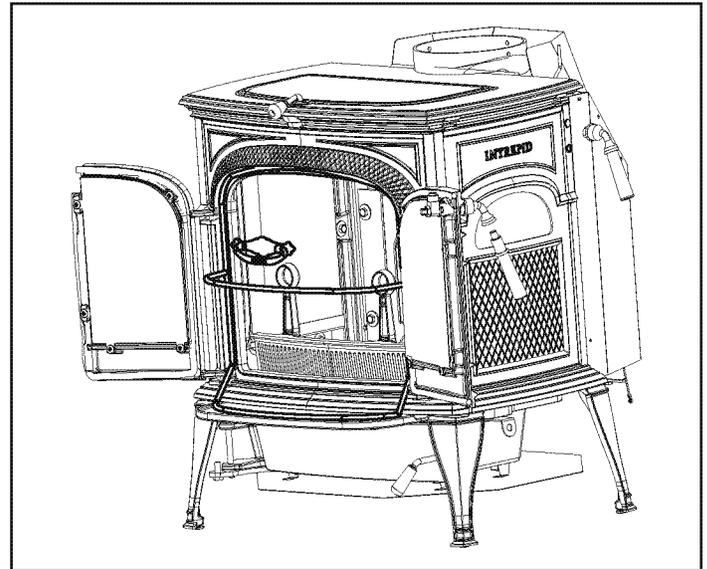


Figure 5.10

WARNING



Fire Risk

- Do not leave the fire unattended when the door is unlatched or when using the fire screen.
- Unstable firewood could fall out of the firebox creating a fire hazard to your home.

F. Reverse the Flue Collar (If necessary)

Tools Required: Phillips head screwdriver.

The flue collar is reversible for either a top or rear venting installation. The appliance is shipped with the flue collar in the top vent position.

Converting Collar For Rear Vent Installation

1. Remove (4) #10 X 1/2" phillips screws from the rear heat shield. Remove heat shield. Figure 5.11.
2. Remove (2) 1/4-20 X 5/8" button head screws from the flue collar. Remove flue collar. Figure 5.11.
3. Turn flue collar to horizontal position. Inspect rope gasket located on the rear cast housing to ensure a leak free seal. Re-install flue collar. Figure 5.12.

Note: The rear heat shield is not used on a rear vent conversion.

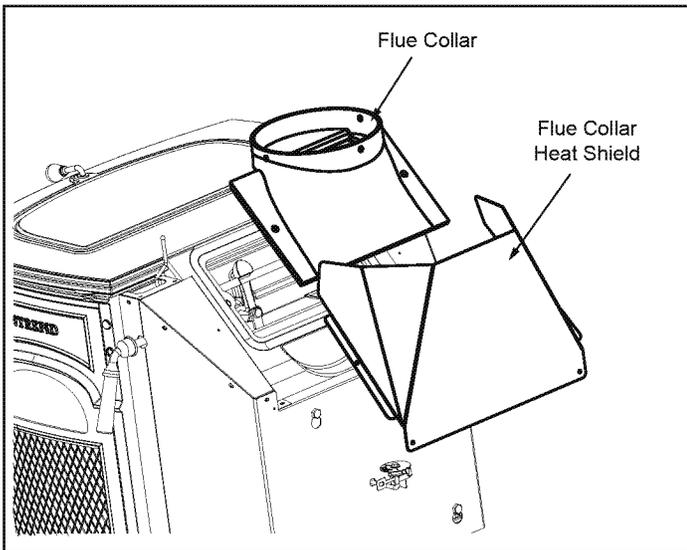


Figure 5.11

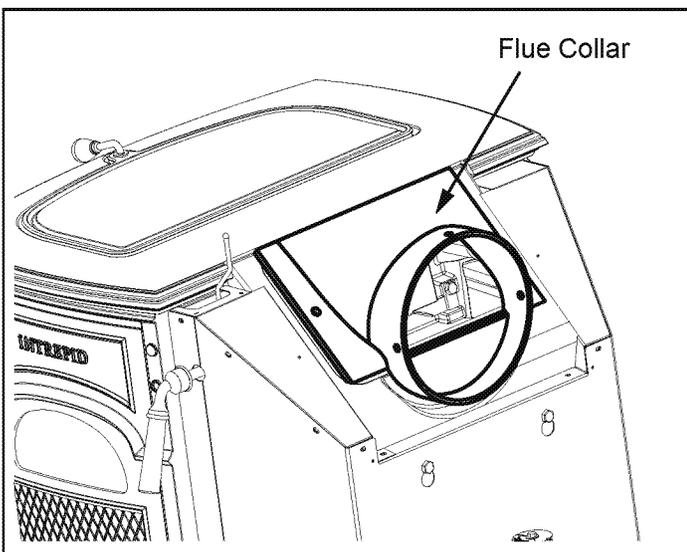


Figure 5.12

G. Outside Air Kit Installation

A source of air (oxygen) is necessary in order for combustion to take place. Whatever combustion air is consumed by the fire must be replaced. Air is replaced via air leakage around windows and under doors. In homes that have tightly sealed doors and windows, an outside air source is needed. An optional Outside Air Kit is available.

Included in 0003265: Air Duct, (1) Hose Clamp, Pipe Elbow, and fasteners

Items Needed for Installation (not supplied)

- Phillips head screw driver
- Silicone sealant
- Drills and saws necessary for cutting holes through the wall or flooring in your home.

1. Remove all materials from packing box.
2. Using a #2 Phillips screw driver attach the flex adapter to the appliance using 4 screws. Figure 5.13 & 5.14.
3. Floor & Rear Installation: Cut a 3" (76 mm) hole in outside wall or floor to accommodate outside air piping. Use 3" (76 mm) aluminum metal flex or rigid piping to directly connect outside air to appliance intake. Use the supplied termination cap with a rodent screen. Seal between the wall (or floor) and the pipe with silicone to prevent moisture penetration.

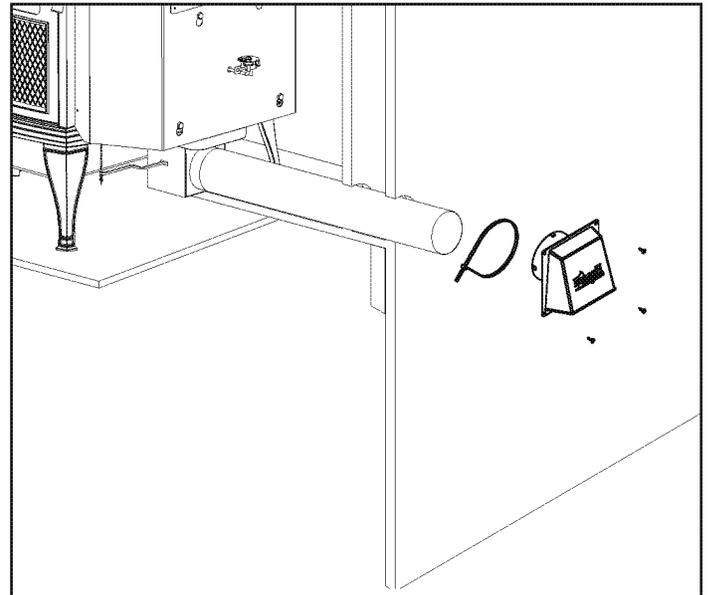


Figure 5.13 - Rear Installation

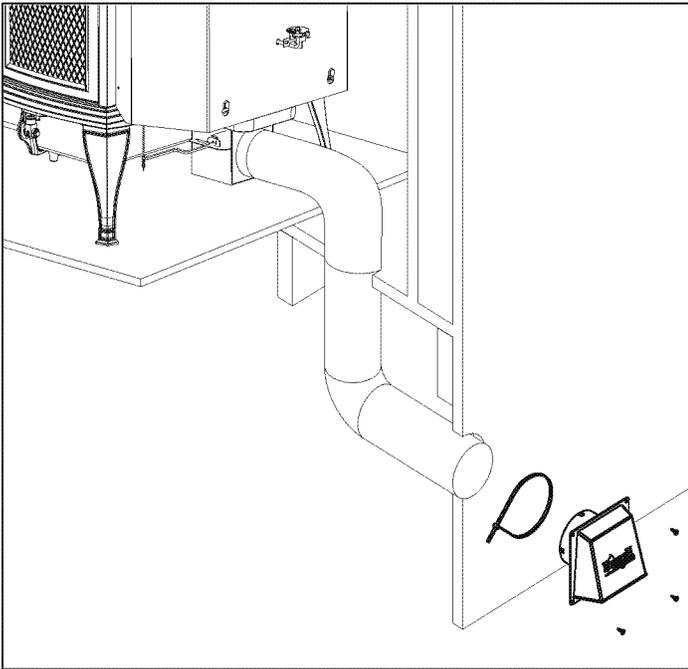


Figure 5.14 - Floor Installation

WARNING



Fire Risk

Asphyxiation Risk

Do not draw outside combustion air from:

- Wall, floor or ceiling cavity
- Enclosed space such as an attic or garage
- Close proximity to exhaust vents or chimneys

Fumes or odor may result



WARNING



Asphyxiation Risk

Outside air inlet must be located to prevent blockage from:

- Leaves
- Snow or ice
- Other debris

Blockage may cause combustion air starvation

Smoke spillage may set off alarms or irritate sensitive individuals.

WARNING



Asphyxiation Risk

Length of outside air supply duct shall NOT exceed the length of the vertical height of the exhaust flue.

- Fire will not burn properly
- Smoke spillage occurs when door is opened due to air starvation

6 Mobile Home Installation - Approved for USA Installation ONLY!

You must use a Vermont Castings Outside Air Kit Part # 0003265 and Mobile Home Bracket Kit Part #0003264 for installation in a mobile home.

1. An outside air inlet must be provided for combustion.
2. Appliance must be secured to the mobile home structure by bolting the legs to the floor.
3. Appliance must be grounded with #8 solid copper grounding wire or equivalent and terminated at each end with N.E.C. approved grounding device.
4. Appliance must be installed with an approved UL103 HT ventilated chimney connector, UL103 HT chimney, and terminal cap with spark arrestor. Never use a single wall connector (appliance pipe) in a mobile home installation. Use only double-wall connector pipe, Dura-Vent DVL, Selkirk Metalbestos DS or Security DL double-wall connector or any listed double-wall connector pipe.
5. In Canada, this appliance must be connected to a 6" (152 mm) factory-built chimney conforming to CAN/ULC-629M, STANDARD FOR FACTORY BUILT CHIMNEYS.
6. Follow the chimney and chimney connector manufacturer's instructions when installing the flue system for use in a mobile home.
7. Maintain clearance to combustibles.
8. Floor protection requirements must be followed precisely.
9. Use silicone to create an effective vapor barrier at the location where the chimney or other component penetrates to the exterior of the structure.

NOTE: Offsets from the vertical, not exceeding 45°, are allowed per Section 905(a) of the Uniform Mechanical Code (UMC). Offsets greater than 45° are considered horizontal and are also allowed, providing the horizontal run does not exceed 75% of the vertical height of the vent. Construction, clearance and termination must be in compliance with the UMC Table 9C. This installation must also comply with NFPA 211.

NOTE: Top sections of chimney must be removable to allow maximum clearance of 13.5 feet (411cm) from ground level for transportation purposes.

10. Burn wood only. Other types of fuels may generate poisonous gases (e.g., carbon monoxide).
11. If appliance burns poorly while an exhaust blower is on in home, (i.e., range hood), increase combustion air.
12. Installation shall be in accordance with the Manufacturers Home & Safety Standard (HUD) CFR 3280, Part 24.

CAUTION

THE STRUCTURAL INTEGRITY OF THE MOBILE HOME FLOOR, WALL AND CEILING/ROOF MUST BE MAINTAINED

Do NOT cut through:

- Floor joist, wall, studs or ceiling trusses.
- Any supporting material that would affect the structural integrity.

WARNING



Asphyxiation Risk

NEVER INSTALL IN A SLEEPING ROOM.

Consumes oxygen in the room.

VERMONT CASTINGS

CONTACT INFORMATION

Hearth & Home Technologies
352 Mountain House Road
Halifax, PA 17032

Please contact your Vermont Castings dealer with any questions or concerns.

For the number of your nearest Vermont Castings dealer

log onto www.vermontcastings.com

CAUTION

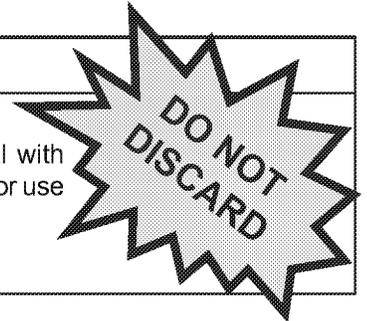


- Important operating and maintenance instructions included.

DO NOT DISCARD THIS MANUAL

- Read, understand and follow these instructions for safe installation and operation.

- Leave this manual with party responsible for use and operation.



We recommend that you record the following pertinent information for your heating appliance.

Date purchased/installed: _____

Serial Number: _____ Location on appliance: _____

Dealership purchased from: _____ Dealer phone: _____

Notes: _____

This product may be covered by one or more of the following patents: (United States) 5341794, 5263471, 6688302, 7216645, 7047962 or other U.S. and foreign patents pending.



*Model: Intrepid FlexBurn 2115-CAT
Hearth and Home Technologies
352 Mountain House Road
Halifax, PA 17032*

APPENDIX A

EPA Correspondence

Sebastian Button

From: Johnson, Steffan <johnson.steffan@epa.gov>
Sent: Thursday, January 25, 2018 11:54 AM
To: Sebastian Button
Cc: Sanchez, Rafael; Aldridge, Amanda; Baumgart-Getz, Adam; Lischinsky, Robert; Toney, Mike
Subject: RE: Woodstove Burn Rate Question

Dear Sebastian,

Thank you for bringing us your concerns regarding the Intrepid IV wood heater and its operations with catalytic controls.

We understand that Omni test laboratories conducted a test as Mr. Toney suggested below. Note that this suggestion was to operate the stove in a manner inconsistent within a normal compliance test protocol.

From our perspective this test run was investigative in nature, conducted to determine if the unit could operate with a catalyst control and function at a higher burn rate. The results of that test demonstrated that such operation would be clearly outside the normal operating envelope for the catalytic controls. As such, we conclude that the investigation verifies the information you initially provided and that the appliance is not capable of proper operations beyond the levels measured by Omni test labs in your compliance testing.

We do NOT consider this test run to be part of the compliance test data set.

We would also add that the operating manual should clearly state that such operations (open door) are not to be conducted while the catalyst is engaged (or something similar such that this investigative test condition is called out as an inappropriate operating condition for a catalyst equipped unit).

While I don't believe we have ever seen a wood heater that could not meet the category 4 burn rates, we recognize that this is a small heater and that the data clearly demonstrate that the unit has been tested under its maximum burn condition.

Please let us know if you have further questions in regards to this matter.

With sincere regards,

Stef Johnson

Stef Johnson | Leader | Measurement Technology Group | Office of Air Quality Planning & Standards | U.S.
Environmental Protection Agency | 109 T.W. Alexander Drive | E-143-02 | Research Triangle Park, NC 27711 | Desk:
919.541.4790 | Cell: 919.698.5096 | Fax: 919.541.0516